HP MPX200 Multifunction Router Data Migration User Guide

Abstract

This guide is intended for administrators of data migration services using the MPX200 Multifunction Router, with a basic knowledge of managing SANs and SAN storage.

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1 Introduction

The MPX200-based DMS is block-based data migration that is independent of a SAN, server, storage protocol (FC and iSCSI), and storage vendor. Because application unavailability during data migration can critically impact services, DMS is designed to reduce down time. DMS supports both online (local and remote) and offline data migration across FC and iSCSI storage arrays. Anyone with knowledge of SAN or SAN storage administration will be able to use DMS.

Important data migration features include the following:

- **FC SAN vendor independent:** The MPX200 supports B-Series, C-Series and H-Series fabrics. MPX200 also supports data migration across multi-vendor FC fabrics.
- **Heterogeneous array support:** The MPX200 supports data migration across heterogeneous arrays (arrays manufactured by different vendors). For a list of the storage array types for which DMS provides support, see "Supported storage arrays" (page 16).
- **Multi-protocol support:** The MPX200 supports data migration across multiple storage networking protocols, including FC and iSCSI. The MPX200 allows data migration between storage arrays of the same or different protocols.
- **Migration to thin-provisioned storage:** The MPX200 supports migration to "thin-provisioned" storage. During the data migration process, the MPX200 can migrate from regular-provisioned storage to thin-provisioned storage. When used with space reclamation tools, this type of storage delivers significant cost savings in deploying new enterprise storage. For more information, see "Migration to a thin-provisioned LUN " (page 29).
- **Online remote migration:** The MPX200 supports online data migration between two remote data centers. A reasonable bandwidth (fat pipe) between two data centers is required to handle the initial copy of the data and the change rate during the data copy. The data migration rate depends on the round-trip latencies between two locations and the available dedicated bandwidth.
- **Data scrubbing:** The MPX200 supports data scrubbing. When retiring the old storage or redeploying the storage, scrubbing data securely overwrites existing data and ensures that old data cannot be retrieved.
- **Ease of use:** The MPX200 has an intuitive GUI that provides many wizard-based operations and a CLI. Both GUI and CLI provide user-level protection and ease of use.
- **Data security and sanity:** The MPX200 provides features to classify storage arrays as *source only*. This classification minimizes the chances of accidental data loss by ensuring that source LUNs cannot be overwritten. The MPX200 also provides the Verify Migration Job wizard to compare data on the source and destination LUNs, and to indicate whether the data copy process occurred without corruption.
- **Migration job scheduling:** The MPX200 provides several job scheduling options that minimize downtime and maximize ease of use.
- **Load balancing:** The Load Balancing option allows the aggregation of throughput from storage array ports, which optimizes migration throughput performance for older-generation, lower-speed arrays (such as 2 Gb and 4 Gb FC).
- **Data migration service logs:** DMS logs are maintained separately from the system logs. DMS logs are designed to help the service professional maintain a full, detailed history of each job performed and can be submitted as a part of the migration report to the customer.
- **Data migration service reports:** Provide reporting of data migration jobs that have either been acknowledged or removed from the system. Each migration job entry in the report lists the job details, including source and destination LUN information.
- **Logging and troubleshooting:** System logs are designed to store a significant number of details that can be used for debugging and troubleshooting. The `save capture` command, see

"save capture" (page 103), helps to capture the configuration details, system logs, and MPX200 state at any time, and can be used for troubleshooting.

- **Licensing:** DMS licenses provide capacity-based (per terabyte) and array-based licenses. For more information, see "Data migration licenses" (page 36).

2 Getting started

This chapter provides information about supported configurations, and hardware and software setup for using DMS with MPX200 and the HP mpx Manager.

Supported configurations

This section describes and illustrates the supported topologies (direct attach, fabric, and multipath), and lists the supported fabric and array types.

Supported topologies

Supported topologies include fabric and multipath configurations.

Fabric configuration

Figure 1 (page 10) and Figure 2 (page 10) show typical setups for data migration with a dual-fabric, HA configuration with both array controller ports and one port from each MPX200 blade connected to each fabric. This configuration enables the MPX200 to perform load balancing.

Figure 1 Single-blade high availability setup

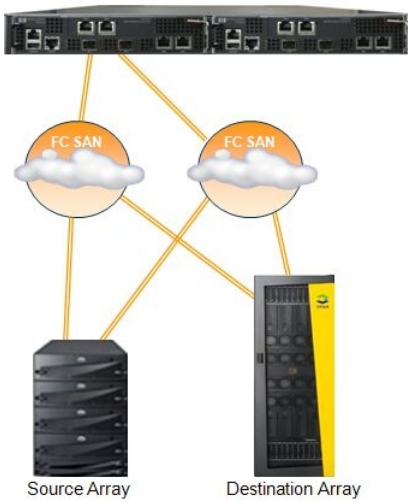


Figure 2 Dual-blade high availability setup

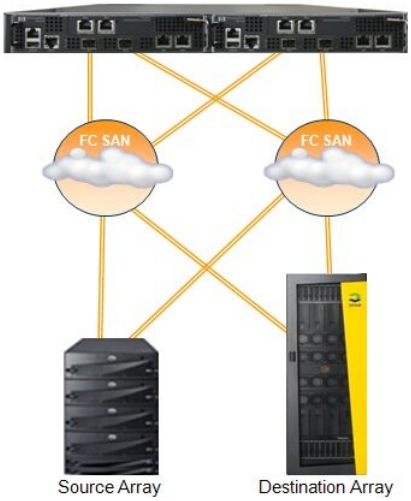
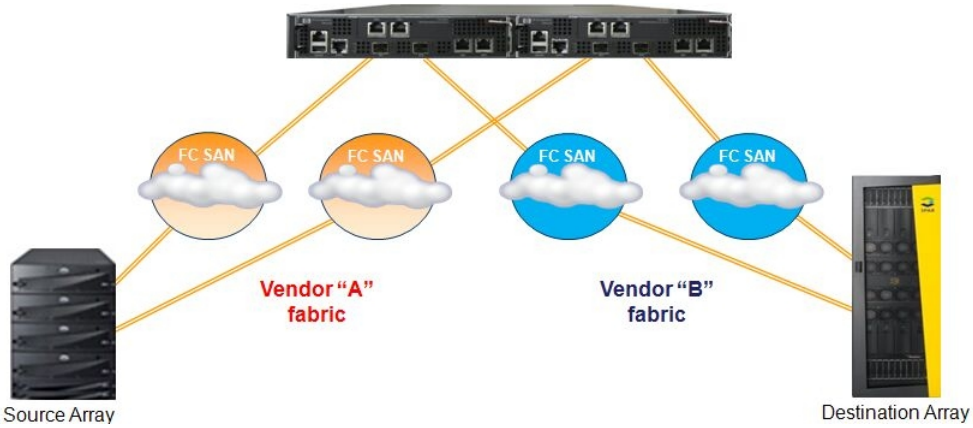


Figure 3 (page 11) shows the configuration used when you are:

- Migrating from one vendor SAN to another vendor SAN.
- Installing a new fabric and do not have enough ports available in the old fabric.

Figure 3 Migration between dissimilar vendor SANs



Data migration configuration

Figures in this section show the typical configurations used for offline and online data migration using MPX200 models. "Performing data migration" (page 41) and "Configuring the data path through MPX200 for online data migration" (page 152) also refer to these figures. The following figure legend applies to all data migration figures in this section.

Figure legend	
HBA <n>	Host Bus Adapter port number
SA <n>	Source array controller A port number
SB <n>	Source array controller B port number
DA <n>	Destination array controller A port number
DB <n>	Destination array controller B port number
BL<n> FC<n>:VPG<n>	MPX200 blade number, Fibre Channel port number, and virtual port group number
PT-SA <n>+VPG<n>	Presented target from MPX200 representing source array controller port number and the VPGroup number used to present the LUNs to the MPX200 (online data migration)
PT-SB <n>+VPG<n>	Presented target from MPX200 representing source array controller port number and the VPGroup number used to present the LUNs to the MPX200 (online data migration)
Solid lines	Physical connections between ports
Dashed and dotted lines	Presented target connections between ports

Figure 4 (page 12) illustrates the topology for offline data migration between two Fibre Channel storage arrays.

Figure 4 Offline, two Fibre Channel arrays

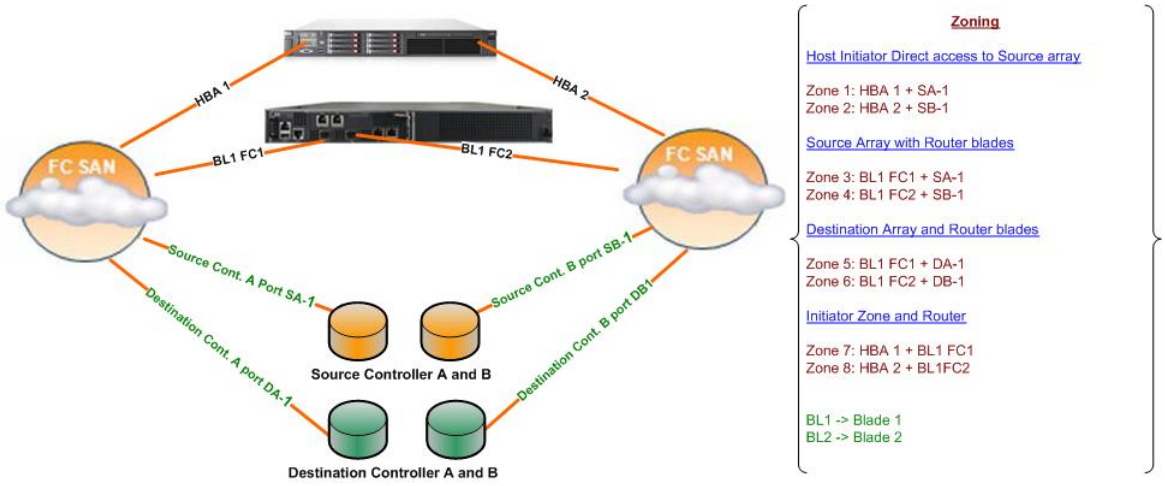
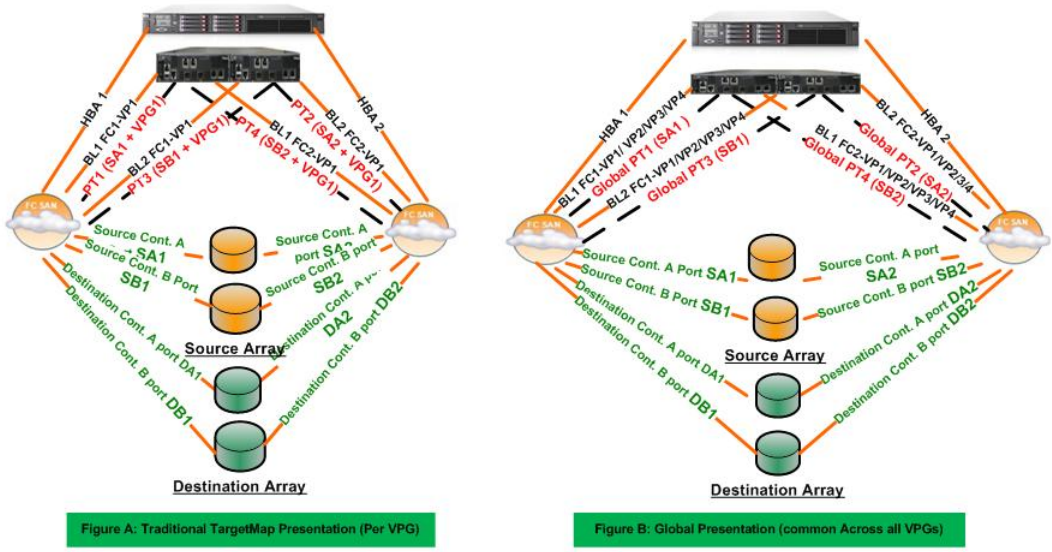

HBA 1
HBA 2
BL1 FC1
BL1 FC2
FC SAN
FC SAN
Source Cont. A Port SA-1
Source Cont. B port SB-1
Destination Cont. A port DA-1
Destination Cont. B port DB1
Source Controller A and B
Destination Controller A and B
Zoning
Host Initiator Direct access to Source array
Zone 1: HBA 1 + SA-1
Zone 2: HBA 2 + SB-1
Source Array with Router blades
Zone 3: BL1 FC1 + SA-1
Zone 4: BL1 FC2 + SB-1
Destination Array and Router blades
Zone 5: BL1 FC1 + DA-1
Zone 6: BL1 FC2 + DB-1
Initiator Zone and Router
Zone 7: HBA 1 + BL1 FC1
Zone 8: HBA 2 + BL1FC2
BL1 -> Blade 1
BL2 -> Blade 2

Figure 5 (page 12) illustrates both online and offline data migration between two Fibre Channel storage arrays.

Figure 5 Online and offline, two Fibre Channel arrays



Zoning

Host Initiator Direct access to Source array
Zone 1: HBA 1 + SA1 + SB1
Zone 2: HBA 2 + SA2 + SB2

Source Array and Router Blades
Zone 3: BL1-FC1-VP1 + SA1 + SB1 + BL2- FC1-VP1
Zone 4: BL1-FC2-VP1 + SA2 + SB2 + BL2 - FC2-VP1

Destination Array and Router Blades
Zone 5: BL1-FC1-VP1 + DA1 + DB1 + BL2-FC1-VP1
Zone 6: BL1-FC2-VP1 + DA2 + DB2 + BL2-FC2-VP1

Initiator Zone to Router
Zone 7: HBA 1 + BL1-FC1-VP1 + BL2-FC1-VP1
Zone 8: HBA 2 + BL1-FC2-VP1 + BL2-FC2-VP1

Presented Targets and Host (For Figure A)
Zone 9: HBA 1 + PT1 (SA1 + VPG1)
Zone 10: HBA 2 + PT2 (SA2 + VPG1)
Zone 11: HBA 1 + PT3 (SB1 + VPG1)
Zone 12: HBA 2 + PT4 (SB2 + VPG1)
BL1 -> Blade 1
BL2 -> Blade 2
VP -> Virtual Port
VPG1 -> Virtual Port Group 1
PT -> Presented Target (result of Lunmask add command on router)

(SA<n> + VPG<n>) -> Indicates the combination of source array controller port and the VPGroups used to create the presentation for the source array controller port under consideration

Presented Targets and Host (For Figure B)
Zone 9: HBA 1 + Global PT 1 (SA1)
Zone 10: HBA 2 + Global PT 2 (SA2)
Zone 11: HBA 1 + Global PT 3 (SB1)
Zone 12: HBA 2 + Global PT 4 (SB2)
BL1 -> Blade 1
BL2 -> Blade 2
VP -> Virtual Port
VPG1 -> Virtual Port Group 1
PT ->Presented target (Result of Global Presentation)

Figure 6 (page 13) illustrates both online and offline data migration between two Fibre Channel storage arrays using MPX200 models with four Fibre Channel ports per blade (eight total Fibre Channel ports).

Figure 6 Online and offline, source array and destination array

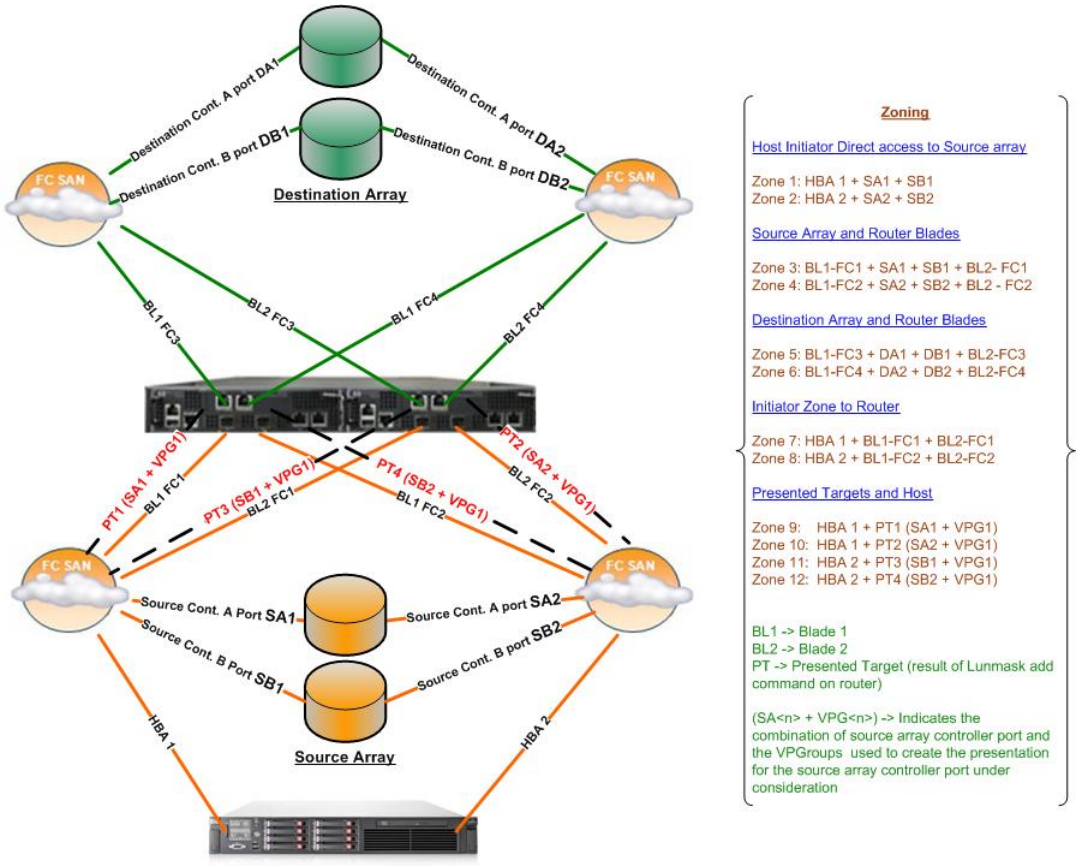

Destination Cont. A port DA1
Destination Cont. B port DB1
Destination Cont. A port DA2
Destination Cont. B port DB2
Destination Array
FC SAN
FC SAN
BL1 FC3
BL2 FC3
BL1 FC4
BL2 FC4
PT1 (SA1 + VPG1)
BL1 FC1
PT3 (SB1 + VPG1)
BL2 FC1
PT4 (SB2 + VPG1)
BL1 FC2
PT2 (SA2 + VPG1)
BL2 FC2
FC SAN
FC SAN
Source Cont. A Port SA1
Source Cont. A port SA2
Source Cont. B Port SB1
Source Cont. B port SB2
Source Array
HBA 1
HBA 2
Zoning
Host Initiator Direct access to Source array
Zone 1: HBA 1 + SA1 + SB1
Zone 2: HBA 2 + SA2 + SB2
Source Array and Router Blades
Zone 3: BL1-FC1 + SA1 + SB1 + BL2- FC1
Zone 4: BL1-FC2 + SA2 + SB2 + BL2 - FC2
Destination Array and Router Blades
Zone 5: BL1-FC3 + DA1 + DB1 + BL2-FC3
Zone 6: BL1-FC4 + DA2 + DB2 + BL2-FC4
Initiator Zone to Router
Zone 7: HBA 1 + BL1-FC1 + BL2-FC1
Zone 8: HBA 2 + BL1-FC2 + BL2-FC2
Presented Targets and Host
Zone 9: HBA 1 + PT1 (SA1 + VPG1)
Zone 10: HBA 1 + PT2 (SA2 + VPG1)
Zone 11: HBA 2 + PT3 (SB1 + VPG1)
Zone 12: HBA 2 + PT4 (SB2 + VPG1)
BL1 -> Blade 1
BL2 -> Blade 2
PT -> Presented Target (result of Lunmask add command on router)
(SA<n> + VPG<n>) -> Indicates the combination of source array controller port and the VPGroups used to create the presentation for the source array controller port under consideration

Figure 7 (page 14) illustrates both online and offline data migration between two Fibre Channel arrays using MPX200 models when the Fibre Channel fabric is also upgraded.

Figure 7 Online and offline, two Fibre Channel arrays (MPX200; fabric upgrade)

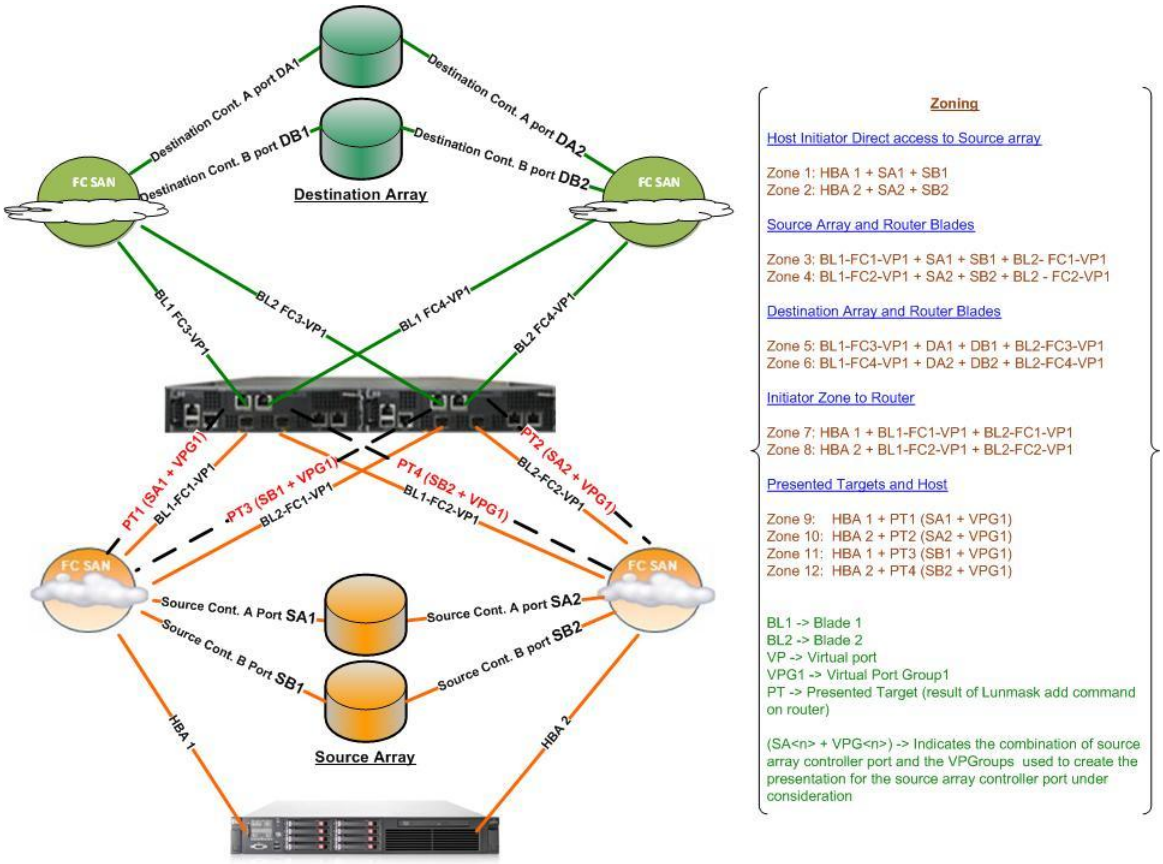

Destination Cont. A port DA1
Destination Cont. B port DB1
Destination Cont. A port DA2
Destination Cont. B port DB2
Destination Array
FC SAN
FC SAN
BL1 FC3-VP1
BL2 FC3-VP1
BL1 FC4-VP1
BL2 FC4-VP1
PT1 (SA1 + VPG1)
BL1-FC1-VP1
PT3 (SB1 + VPG1)
BL2-FC1-VP1
PT4 (SB2 + VPG1)
BL1-FC2-VP1
PT2 (SA2 + VPG1)
BL2-FC2-VP1
FC SAN
FC SAN
Source Cont. A Port SA1
Source Cont. A port SA2
Source Cont. B Port SB1
Source Cont. B port SB2
Source Array
HBA 1
HBA 2
Zoning
Host Initiator Direct access to Source array
Zone 1: HBA 1 + SA1 + SB1
Zone 2: HBA 2 + SA2 + SB2
Source Array and Router Blades
Zone 3: BL1-FC1-VP1 + SA1 + SB1 + BL2- FC1-VP1
Zone 4: BL1-FC2-VP1 + SA2 + SB2 + BL2 - FC2-VP1
Destination Array and Router Blades
Zone 5: BL1-FC3-VP1 + DA1 + DB1 + BL2-FC3-VP1
Zone 6: BL1-FC4-VP1 + DA2 + DB2 + BL2-FC4-VP1
Initiator Zone to Router
Zone 7: HBA 1 + BL1-FC1-VP1 + BL2-FC1-VP1
Zone 8: HBA 2 + BL1-FC2-VP1 + BL2-FC2-VP1
Presented Targets and Host
Zone 9: HBA 1 + PT1 (SA1 + VPG1)
Zone 10: HBA 2 + PT2 (SA2 + VPG1)
Zone 11: HBA 1 + PT3 (SB1 + VPG1)
Zone 12: HBA 2 + PT4 (SB2 + VPG1)
BL1 -> Blade 1
BL2 -> Blade 2
VP -> Virtual port
VPG1 -> Virtual Port Group1
PT -> Presented Target (result of Lunmask add command on router)
(SA<n> + VPG<n>) -> Indicates the combination of source array controller port and the VPGroups used to create the presentation for the source array controller port under consideration

Figure 8 (page 14) shows the offline data migration between a Fibre Channel storage array and an iSCSI storage array.

Figure 8 Online and Offline Fibre Channel and iSCSI arrays

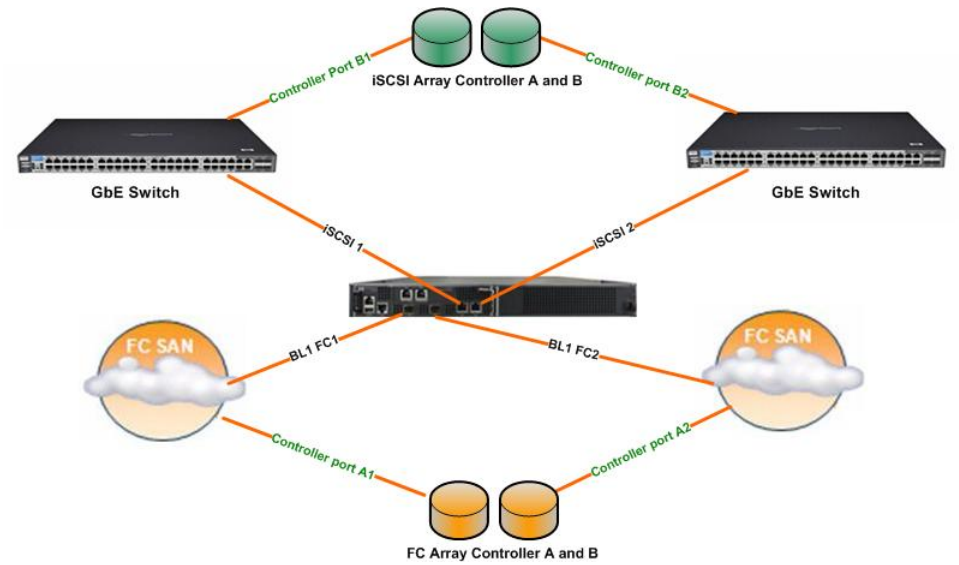


Figure 9 (page 15) illustrates remote migration using WAN links between two data centers.

Figure 9 Remote migration using FCIP over WAN links

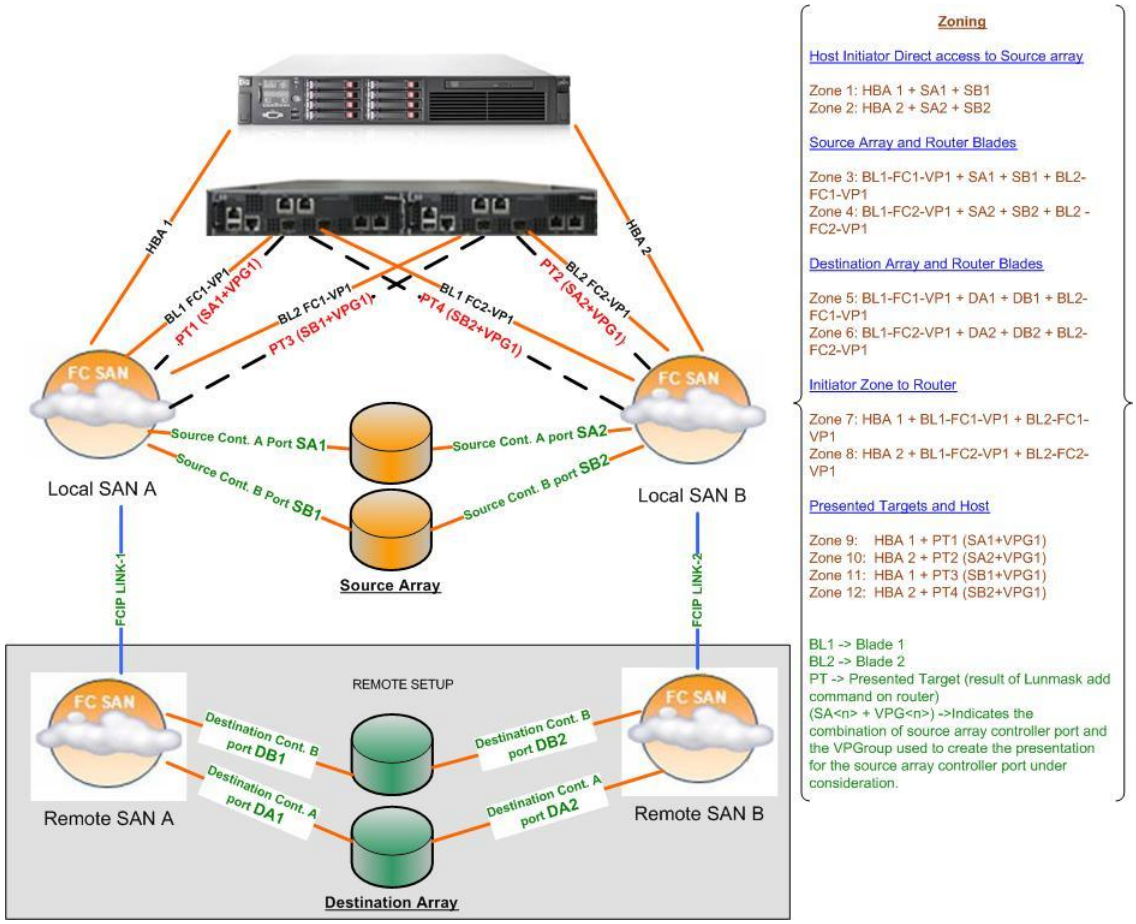
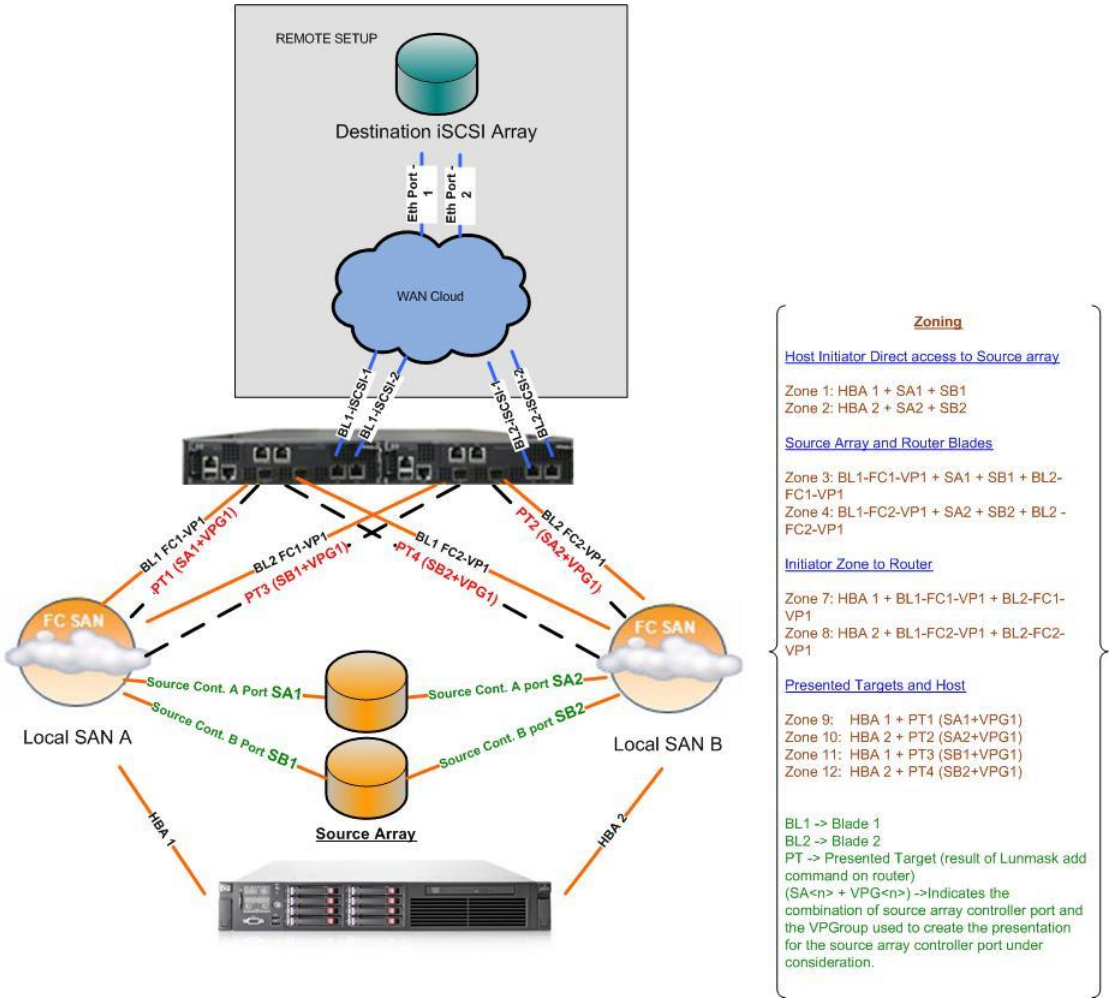

Zoning
Host Initiator Direct access to Source array
Zone 1: HBA 1 + SA1 + SB1
Zone 2: HBA 2 + SA2 + SB2
Source Array and Router Blades
Zone 3: BL1-FC1-VP1 + SA1 + SB1 + BL2-FC1-VP1
Zone 4: BL1-FC2-VP1 + SA2 + SB2 + BL2 - FC2-VP1
Destination Array and Router Blades
Zone 5: BL1-FC1-VP1 + DA1 + DB1 + BL2-FC1-VP1
Zone 6: BL1-FC2-VP1 + DA2 + DB2 + BL2-FC2-VP1
Initiator Zone to Router
Zone 7: HBA 1 + BL1-FC1-VP1 + BL2-FC1-VP1
Zone 8: HBA 2 + BL1-FC2-VP1 + BL2-FC2-VP1
Presented Targets and Host
Zone 9: HBA 1 + PT1 (SA1+VPG1)
Zone 10: HBA 2 + PT2 (SA2+VPG1)
Zone 11: HBA 1 + PT3 (SB1+VPG1)
Zone 12: HBA 2 + PT4 (SB2+VPG1)
BL1 -> Blade 1
BL2 -> Blade 2
PT -> Presented Target (result of Lunmask add command on router)
(SA<n> + VPG<n>) ->Indicates the combination of source array controller port and the VPGroup used to create the presentation for the source array controller port under consideration.
HBA 1
HBA 2
BL1 FC1-VP1 PT1 (SA1+VPG1)
BL2 FC1-VP1 PT3 (SB1+VPG1)
BL1 FC2-VP1 PT4 (SB2+VPG1)
BL2 FC2-VP1 PT2 (SA2+VPG1)
FC SAN
FC SAN
Local SAN A
Local SAN B
Source Cont. A Port SA1
Source Cont. B Port SB1
Source Cont. A port SA2
Source Cont. B port SB2
Source Array
FCIP LINK-1
FCIP LINK-2
REMOTE SETUP
FC SAN
FC SAN
Remote SAN A
Remote SAN B
Destination Cont. B port DB1
Destination Cont. A port DA1
Destination Cont. B port DB2
Destination Cont. A port DA2
Destination Array

Figure 10 (page 16) illustrates remote migration using iSCSI.

Figure 10 Remote migration for iSCSI


REMOTE SETUP
Destination iSCSI Array
Eth Port - 1
Eth Port - 2
WAN Cloud
BL1-iSCSI-1
BL1-iSCSI-2
BL2-iSCSI-1
BL2-iSCSI-2
BL1 FC1-VP1 PT1 (SA1+VPG1)
BL2 FC1-VP1 PT3 (SB1+VPG1)
BL1 FC2-VP1 PT4 (SB2+VPG1)
BL2 FC2-VP1 PT2 (SA2+VPG1)
FC SAN
FC SAN
Source Cont. A Port SA1
Source Cont. B Port SB1
Source Cont. A port SA2
Source Cont. B port SB2
Local SAN A
Local SAN B
Source Array
HBA 1
HBA 2
Zoning
Host Initiator Direct access to Source array
Zone 1: HBA 1 + SA1 + SB1
Zone 2: HBA 2 + SA2 + SB2
Source Array and Router Blades
Zone 3: BL1-FC1-VP1 + SA1 + SB1 + BL2-FC1-VP1
Zone 4: BL1-FC2-VP1 + SA2 + SB2 + BL2 - FC2-VP1
Initiator Zone to Router
Zone 7: HBA 1 + BL1-FC1-VP1 + BL2-FC1-VP1
Zone 8: HBA 2 + BL1-FC2-VP1 + BL2-FC2-VP1
Presented Targets and Host
Zone 9: HBA 1 + PT1 (SA1+VPG1)
Zone 10: HBA 2 + PT2 (SA2+VPG1)
Zone 11: HBA 1 + PT3 (SB1+VPG1)
Zone 12: HBA 2 + PT4 (SB2+VPG1)
BL1 -> Blade 1
BL2 -> Blade 2
PT -> Presented Target (result of Lunmask add command on router)
(SA<n> + VPG<n>) ->Indicates the combination of source array controller port and the VPGroup used to create the presentation for the source array controller port under consideration.

Supported FC fabrics

DMS is currently supported with B-Series, C-Series and H-Series, 2 Gb, 4 Gb, 8 Gb, and 16 Gb FC fabrics.

Supported storage arrays

Table 1 (page 16) lists the storage array types for which DMS provides support. To view the most current compatibility matrix, see www.hp.com.

Table 1 Supported storage arrays

Vendor	Storage Array
Dell	EqualLogic PS Series iSCSI SAN Arrays Compellent Series 30 and 40 Controllers
EMC	CLARiiON CX family CLARiiON AX family Symmetrix DMX family Symmetrix VMAX SE
Fujitsu	ETERNUS DX400 arrays ETERNUS DX440 S2 arrays ETERNUS DX8400 arrays
HDS	Thunder 95xx V series Lightning 99xx V series

Table 1 Supported storage arrays *(continued)*

Vendor	Storage Array
	AMS family WMS family USP family TagmaStore Network StorageController model NSC55
HP	HP Storage MSA family HP Storage EVA family HP Storage XP P9000 HP Storage XP10000 and 12000 HP Storage XP20000 and 24000 HP Storage P4000 G2 SAN Solutions (iSCSI) HP 3PAR StoreServ 10000 HP 3PAR StoreServ 7000 HP 3PAR F-Class HP 3PAR T-Class HP 3PAR S-Class HP SAN Virtualization Services Platform (SVSP)
IBM	System Storage DS3000 family System Storage DS4000 family System Storage DS5000 family System Storage DS8000 family XIV Storage System family Storwize V7000 Unified disk system
NEC	D-Series SAN Storage arrays
NetApp	FAS270 FAS2000 Series FAS3100 Series FAS6000 Series NetApp arrays that support Cluster-Mode technology
Xiotech	Emprise Storage family Magnitude 3D 4000 family

Hardware and software setup

Follow the procedures and guidelines in this section for setting up hardware and software.

Hardware setup

For information on installing MPX200, refer to the *HP MPX200 Multifunction Router User Guide*.

To set up the hardware for DMS:

1. To manage the MPX200, install the HP mpx Manager utility on any computer running Windows 2003, Windows 2008, RedHat, SuSE or Apple OS X. The MPX200 must be accessible over the network connection from the machine on which HP mpx Manager is installed.
2. Set up the MPX200 management port IP address. For more information, refer to the *MPX200 Intelligent Storage Router Quick Start Guide*.
3. Connect the storage array (source and destination) controller ports to an FC switch. For more information on various topology configurations, see "Data migration configuration" (page 11).
4. Connect the FC ports of the MPX200 to the FC switches where the array controller ports are connected. For more information on various topology configurations, see "Data migration configuration" (page 11).

Software setup

Software setup for DMS includes the following:

- **Zoning:** Perform zoning on the FC switches so that array controller ports are visible to the MPX200, and the array is able to see virtual ports created by MPX200 FC ports and can present LUNs to the MPX200.
- **LUN presentation:** Ensure the appropriate data LUNs are presented from the storage arrays to the MPX200.
- **Multipathing:** For online data migration, ensure that the latest multipathing software is installed on the host server and that both router blades are using the same firmware version.

High Availability considerations

For HA configurations where multiple FC ports (from one or both blades) of the router are visible on the source or destination array, ensure that all WWPNs from the same virtual port group across both blades of the MPX200 are configured under a single host or host group in the array management software.

For the MPX200 to work correctly, you must set up all WWPNs from the same VPG (across both blades) as a single host, and you must also project unique LUNs to this host in the storage array. Set up multiple VPGs as different hosts in the storage array. Do not present the same LUN to multiple VPGs (hosts associated with the MPX200). Failure to do so can lead to unpredictable and erroneous behavior. For additional information, see "VPG" (page 24).

3 Data migration objects

Thls chapter covers the objects that the MPX200 DMS uses in data migration.

Arrays

DMS either discovers the FC target ports zoned in with the MPX200 FC ports, or it discovers and logs into iSCSI qualified name (IQN) targets using iSCSI login. It forms an array when at least one data LUN is presented to the MPX200 from that array. If no data LUN is presented to the MPX200, all array ports are shown in the HP mpx Manager GUI and CLI as target ports.

DMS classifies the discovered storage array controllers into two categories: targets and arrays. All array controller ports are initially identified as targets by the MPX200. After a single data LUN is detected on the target, DMS forms an entity called an array. A specific LUN seen through multiple FC target ports or IQN targets are grouped under a single array.

NOTE: The MPX200 may detect a single storage array as two storage arrays if another set of LUNs are presented to the MPX200 through other target ports of the same array. This scenario typically occurs when you have large storage arrays such as the EMC-DMX, HP-XP, or IBM DS8000.

Configure the array entity for the DMS using the following attributes:

- **Symbolic name:** Upon forming an array, the MPX200 Multifunction Router automatically assigns it a symbolic name. HP recommends you change the array's symbolic name to a more meaningful name as the migration log containing source and destination LUNs becomes associated with that symbolic name.
- **Array type:** DMS requires the classification of each array as either *Source*, *Destination*, *Source+Destination*, or *None*. The Data Migration wizard, during the creation of migration jobs, restricts assignment of a source LUN only from arrays that have an attribute *Source* or *Source+Destination*. The wizard restricts assignment of a destination LUN only from arrays with attribute *Destination* or *Source+Destination*. Use the array attribute *Source+Destination* only when you need to create copies of a LUN on the same array.

  Select the array type attribute *None* to exclude a storage array from data migration. The MPX200 simultaneously supports both iSCSI connectivity and data migration service. Typically, you would use the *None* attribute when the MPX200 provides only iSCSI connectivity for that storage array or to define an array only for a data management LUN.
- **Array bandwidth:** This feature is applied only to a source array. This value indicates the maximum bandwidth the MPX200 can use for a data migration task from the source array . The bandwidth is computed over all paths. The MPX200 is restricted to the user-assigned array bandwidth to migrate the data. This feature allows other applications and servers using the same source array to continue to perform at an acceptable performance level. The minimum bandwidth required for data migration is 50 MBps.
- **Load balancing:** The MPX200 detects all available active and passive paths to the LUN. Load balancing balances the load for migration jobs over multiple active paths, thus improving the migration rate. Disable load balancing only if there is a problem performing data migration. NOTE: The MPX200 may detect a single storage array as two storage arrays if another set of LUNs are presented to the MPX200 through other target ports of the same array. This scenario typically occurs when you have large storage arrays such as the EMC-DMX, HP-XP, or IBM DS8000.
- **Maximum Concurrent I/O:** Because the source array is in use by hosts that may or may not be part of the migration process, I/Os to the source array may exceed the maximum concurrent I/Os supported by the array. Most arrays are equipped to handle this scenario and start returning the SCSI status as 0x28(TASK SET FULL) or 0x08(BUSY) for the incoming I/Os that exceed the arrays' maximum concurrent I/O limit. The TASK SET FULL or BUSY SCSI status

indicates congestion at the array controller. Thus, the MPX200 may require automated throttling while trying to maximize migration performance by increasing concurrent I/Os. To control automatic throttling and pacing of migration I/O, use the Enable I/O Pacing option.

- **Enable I/O Pacing:** This feature is applied only to a source array. The MPX200 intelligently manages concurrent migration I/Os to maximize overall migration throughput. If a Queue Full or Busy condition is detected, the router throttles the migration I/O until it detects either that the array queue is full or a busy condition. After the condition is cleared, it starts issuing additional migration I/Os. This method maximizes host and migration I/O performance.

  To achieve pacing, the router uses a configured, concurrent I/O limit and an internal counter (current concurrent I/O limit, which is less than or equal to the configured limit) and a set of steps for automatic throttling and pacing of migration I/O. The user sets the configured limit.

Data migration job groups

The MPX200 uses the concept of job groups to associate data migration jobs with user-defined groups. A job group allows better management of data migration jobs. You can create a maximum of 32 job groups that are shared between the two blades on a chassis. Both the HP mpx Manager and the CLI provide options for removing and editing job groups.

Creating job groups is an opportunity to organize your data migration jobs. One typical organizational model is creating groups that relate to application type or server class. For example, you could classify a data migration job related to the Microsoft Exchange application as part of the "Exchange" group and a data migration job related to a payroll application as part of the "Payroll" group. Data migration jobs are then tracked separately within their respective groups. Group information for each data migration job is recorded in the data migration log, see "Data migration job log" (page 64).

If you do not define a group, all jobs are assigned to the default group, Group 0. You cannot delete Group 0.

Data migration jobs

DMS processes data migration jobs according to a schedule. You can schedule a maximum of 512 jobs (256 jobs per blade) to run at any time. This section covers job attributes, migration types, job scheduling, job states and job failover and failback.

Job attributes

Data migration jobs include the following attributes:

- **Migration type:** Data migration jobs can be either online (local or remote) or offline. For more information, see "Migration types" (page 21).
- **Source and destination LUN:** For an offline migration job, you can configure a single source LUN to migrate to one or multiple destination LUNs. For an online migration job, you can configure a single source LUN to migrate to only one destination LUN. Any specified destination LUN can be part of a single data migration job.
- **Job groups:** For better manageability, you can configure data migration jobs to belong to a specific, user-defined job group. By default, a job is assigned to a default group, Group 0. For more information, see "Data migration job groups" (page 20).
- **Scheduling:** You can configure data migration jobs to start immediately, start at a specified time, or to use a priority-based serial scheduling. For more information, see "Job scheduling" (page 21).

- **I/O size:** You can configure each data migration job to migrate data using a specified I/O size. Different types of arrays and LUNs may provide optimum performance based on the I/O size. The default size is 64 K.
- **Thin-provisioned LUN:** MPX200 supports conversion of a regularly provisioned LUN to a thin-provisioned LUN. If a destination LUN supports thin provisioning, you can opt to configure this migration job as thin provisioned. For more information, see "Migration to a thin-provisioned LUN " (page 29).

The data migration wizard enables you to configure multiple jobs in a batch mode. The jobs configured in batch mode have the same common attributes. For more information, see "Scheduling data migration jobs in batch mode" (page 58).

Migration types

DMS supports both offline and online (local and remote) migration job types.

Offline data migration

DMS as an offline service allows you to migrate data between FC storage arrays, iSCSI storage arrays, or FC and iSCSI storage arrays. Offline service assumes that when a data migration job for the specified LUN starts, access to the LUN is blocked for servers and applications that are using the source LUNs for data storage. You do not need to bring down these applications during the initial setup and configuration. DMS lets you setup and configure tasks (except for immediate scheduling of the jobs) while applications are running. Only during the actual data migration does an application or a server need to be taken offline.

Online data migration

As an online service, DMS allows you to use the MPX200 to migrate data while an application remains online and continues to access the source data. Online data migration can be either local or remote (online data migration between two remote data centers). For online data migration, you must configure the data path for the source LUNs through the MPX200. For more information, see "Presenting LUNs to the server for online data migration" (page 46).

Job scheduling

The MPX200 data migration service provides multiple data migration job scheduling options to optimize bandwidth usage and minimize application down time. It provides a priority-based serial scheduling feature that enables you to queue migration jobs and execute them in serial or parallel fashion, based on available resources.

You can schedule data migration jobs for execution in the following ways:

- Immediate Schedule (start now)
- Delayed Schedule (start at a later time within the next 30 days)
- Serial Schedule (priority-based scheduling)
- Configure Only (manually start later)

Immediate Schedule

Use the **Immediate Schedule** option to schedule a data migration job to instantly start data migration. For offline data migration, ensure that both the source and destination LUNs are not being accessed by any application when this option is selected.

Delayed schedule

Use the **Delayed schedule** option to schedule a data migration job to start at a later time. When you select this option during configuration of a migration job, you are requested to enter the start time. This allows you to configure a migration job during normal business hours and perform actual

data migration during off peak hours. For example, the online data migration initial copy operation is performed during off peak hours.

Serial Schedule

The **Serial Schedule** option is designed to provide maximum flexibility for data migration. Even though DMS supports 512 (256 per blade) simultaneous migration jobs, typical array performance can be maximized by having only four to eight LUNs under active migration. Serial scheduling of the job allows configuration of all 256 jobs per blade at the same time, while having fewer active jobs at a time, which results in optimum array performance during data migration.

Serial scheduling allows you to configure migration jobs that can have the same or different priority. If you need to configure a large number of jobs (256, for example), you can configure them in batches such that the first four to eight jobs are scheduled at priority 1, the next four to eight jobs at priority 2, and so on. This scheduling arrangement ensures that when the serial schedule starts, no more than four to eight jobs are running simultaneously, and ensures optimum data migration performance.

To achieve this performance, serial scheduling requires a job priority for each data migration job. Multiple data migration jobs can have the same priority. Migration jobs with the same priority are run together. Job priority 1 is highest and job priority 256 is lowest. After all the jobs are configured for serial execution, you must schedule this batch of serially scheduled jobs. The batch can be started immediately or at a later time. The Serial Data Migration Jobs Options dialog box provides an easy way to start or schedule the batch.

After the serial batch starts to run, all jobs having the highest priority are completed before the jobs scheduled at the next priority level start to execute. Only one serial schedule can be active at any time.

For serial scheduled jobs, ensure that the migration LUNs for same-priority jobs are similar in size. A substantial size difference could cause a smaller migration job to complete earlier than a larger migration job. To maximize migration throughput, try to group jobs of approximately the same size when you assign job priority.

Configure Only

The **Configure Only** option enables you to configure migrations jobs without a specified start time. With this option, you must start the migration jobs at a later time. This option provides the advantage that migration jobs can be started only with explicit user intervention.

One of the important uses of the Configure Only option is to verify all configured migration jobs at your desk. When a migration job is configured, a detailed entry is created in the migration log. After configuring all migration jobs, you can export the migration logs to a CSV file that you can view use to validate the migration jobs using tools such as MIcrosoft Excel.

This option is also very useful for offline migration jobs when the exact down time of the application is not known. Specify Configure Only when you need to configure all migration jobs without requiring any application down time.

Job states

Table 2 (page 22) lists the possible data migration job states.

Table 2 Possible data migration job states

Job State	Description
Running	Job is currently running. You can pause or stop a running job.
Scheduled	Job is waiting to be run. You can stop and later restart a scheduled job.
Completed	Job is complete. You must acknowledge a completed job.

Table 2 Possible data migration job states *(continued)*

Job State	Description
Paused	A running job has been paused by the user. You can resume or stop a paused job. A paused job that is resumed continues running from the point where it was paused.
Stopped	A running, scheduled, failed, or pending job has been halted. You can restart or remove a job in the stopped state. A stopped job that is restarted begins at the job start.
Failed	Sync up errors caused the online local migration job to fail, or a lost or full data management LUN caused the online remote migration to fail.
Suspended	A job goes into a suspended state when access to either the source or destination LUN is lost.
Configured	A job has been created with the Configure Only option without a specified start time.
Synchronizing	A job goes into this state when a data migration copy is completed and the router is synchronizing the DRL blocks with the destination.

Job failover and failback

Data migration job failover and failback extends the current support for high availability. The feature adds a new infrastructure for moving the migration job between blades. Utilizing this infrastructure, migration jobs can be failed over and fail back between blades.

Migration job failover is a process of moving a migration job from its owner blade to a peer blade. Migration job failback is a process of returning a previously failed over job to its original owner when that job is restored after a failure. Both failover and failback virtually use the same process and can be done manually by changing the migration ownership.

The feature also adds support for automatic failover. Automatic failover enables the second blade to automatically take over the migration jobs of its peer when the peer goes down.

To configure automatic failover using mpx Manager:

1. In the left pane, select the **Services** tab, and then click **Blade 1**.

   The **Data Migration Info** page appears in the right pane.
2. Under **Migration Parameters**:
   a. Enter a value in the **Job Auto-failover Timer (Seconds)** box that indicates the number of seconds that the MPX200 waits for the source or destination LUN to come up after the job owner blade is powered down or the source or destination LUN becomes unavailable on the owner blade. The default value is 600.
   b. Select the **Job Auto-Failover Enable** check box.
3. Click **Set**.
4. Repeat the preceding steps for Blade 2.

To set automatic failover parameters using the CLI, issue the `migration_params set` command. For example:

```
MPX200 <1> (admin) (miguser) #> migration_params set

Local Migration Periodic Flush Interval (Secs, Min=30 ) [30 ]
Remote Migration Periodic Flush Interval (Secs, Min=300 ) [900 ]
Job Auto-failover Timer (Secs, Min=600 ) [900 ]
Job Auto-failover Policy (1=Disabled, 2=Enabled) [2 ]

Successfully Modified Migration Global Parameters
```

NOTE: You must change the **Job Auto-failover Timer** value before you make a destination or source LUN unavailable. The timer value change applies only to the currently running job.

Job failover/failback rules:

- Both MPX blades must have connectivity to both Source and Destination arrays.
- Both MPX blades must have the same Group name available.
- Failover happens when the owner blade remains in down state until the *Autofailover* timer expires.
- Failover happens if the resource (source/destination) LUN becomes unavailable on the owner blade until the *Autofailover* timer expires.
- Failback applies only when the job fails over due to the owner blade going down and returning online.
- Failback does not occur if the resources come back online on the owner blade.

To enable automatic failover and failback in HP mpx Manager, set the global migration parameters **Job Auto Failover Timer** and **Job Auto Failover policy**.

NOTE: You must change the `Job Auto-failover Timer` value before you make unavailable a destination or source LUN. The timer value change applies only to the currently running job.

To perform manual failover and failback, issue the `migration change_ownership` command. For example:

```
MPX200 <1> (admin) (miguser) #> migration change_ownership

Index Id Creator Owner Type Status Job Description
----- -- ------- ------ ---- ------------------------ -------------------------------------
0 0 1 1 Online ..

Running DGC RAID-2:VPG1:000 to HP HSV210-1...
Please select a Index from the list above ('q' to quit): 0

Do you wish to continue with the operation(yes/no)? [No] yes

All attribute values for that have been changed will now be saved.
```

VPG

VPGs are designed to support concurrent migrations of both a large number of LUNs and multiple servers. Each FC port of the MPX200 can present multiple virtual ports. The first four virtual ports from each physical FC port (Blade1-FC1, Blade1-FC2, Blade2-FC1, and Blade2- FC2) on the MPX200 form a single VPG. The following examples demonstrate how the VPGs are formed. By default, VPG1 is enabled. Each VPG should be represented as a single host entity to the storage array.

For more information about enabling and zoning VPGs, see the *HP MPX200 Multifunction Router User Guide*, chapter covering configuration.

VPG examples

Table 3 (page 24) and Table 4 (page 25) present example VPG WWPNs. In Table 4 (page 25), the bold numbers in the WWPN column indicate the various virtual ports.

Table 3 Example: Base WWPNs

Blade	FC Port	WWPN
1	1	21:00:00:c0:dd:13:2c:60
1	2	21:00:00:c0:dd:13:2c:61
2	1	21:00:00:c0:dd:13:2c:68
2	2	21:00:00:c0:dd:13:2c:69

Table 4 Example: Four WWPNs per VPG

VPG	Virtual Port Number	WWPN
VPGroup1	Blade1-FC1-VP1	21:**00**:00:c0:dd:13:2c:60
	Blade1-FC2-VP1	21:**00**:00:c0:dd:13:2c:61
	Blade2-FC1-VP1	21:**00**:00:c0:dd:13:2c:68
	Blade2-FC2-VP1	21:**00**:00:c0:dd:13:2c:69
VPGroup2	Blade1-FC1-VP2	21:**01**:00:c0:dd:13:2c:60
	Blade1-FC2-VP2	21:**01**:00:c0:dd:13:2c:61
	Blade2-FC1-VP2	21:**01**:00:c0:dd:13:2c:68
	Blade2-FC2-VP2	21:**01**:00:c0:dd:13:2c:69
VPGroup3	Blade1-FC1-VP3	21:**02**:00:c0:dd:13:2c:60
	Blade1-FC2-VP3	21:**02**:00:c0:dd:13:2c:61
	Blade2-FC1-VP3	21:**02**:00:c0:dd:13:2c:68
	Blade2-FC2-VP3	21:**02**:00:c0:dd:13:2c:69
VPGroup4	Blade1-FC1-VP4	21:**03**:00:c0:dd:13:2c:60
	Blade1-FC2-VP4	21:**03**:00:c0:dd:13:2c:61
	Blade2-FC1-VP4	21:**03**:00:c0:dd:13:2c:68
	Blade2-FC2-VP4	21:**03**:00:c0:dd:13:2c:69

Using VPGs on an FC array

If an FC storage array is limited to 256 LUNs mapped to a host, enable multiple VPGs from the MPX200. Each VPG becomes a separate host on the array. The VPGs enable the MPX200 to "see" up to 1,024 LUNs from a single array (256 per VPG).

NOTE: In the scenario where at least one LUN under migration belongs to an HP-UX host, and other LUNs belong to other host type operating systems (Windows, Linux, Solaris, or VMware), use VPGs to create different host types for the HP-UX host and other hosts. Use one VPG to present LUNs for the HP-UX host and different VPGs to present LUNs for the remaining OSs.

For more information on configuring VPGs on an FC array, see the chapter covering configuration in the *HP MPX200 Multifunction Router User Guide*.

Presented targets

Presented targets includes both *virtual* presentation and *global* presentation.

Virtual presentation

For online data migration, you must insert the MPX200 in the server's data path. As a result, the servers access the source LUNs through the MPX200. To insert the MPX200 in the server data path and enable access to the source LUNs through the MPX200, you must first create a virtual presentation of the source array target ports. This virtual presentation is referred to as a *presented target*. A VPG and source array target port represents each presented target. Thus, a single source array target port may have up to four presented targets, one associated with each VPG. (VPG1, VPG2, VPG3, and VPG4). The example in Figure 11 (page 26) shows how to create multiple presented targets by combining a target port on the source array with the MPX200 VPG.

Figure 11 Presented targets: virtual presentation

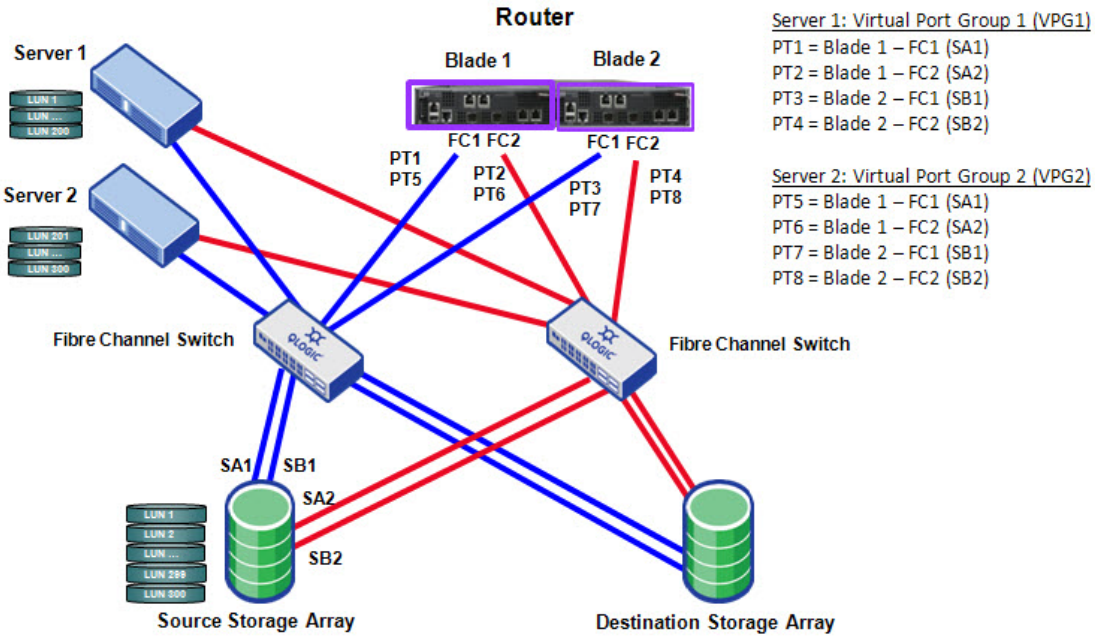


Figure 11 (page 26) shows:

- LUNs from a single source storage array allocated to two servers. Use the Target Map Wizard to configure two separate VPGs to map LUNs from the storage array to Server1 and Server2.
- Four target ports (WWPNs) on the source array are zoned in with two VPGs (VPG1 and VPG2) on the MPX200.
- LUNs associated with VPG1 are for Server1, and LUNs associated with VPG2 are for Server2.
- Four presented target ports (PT1, PT2, PT3, and PT4) depict the four source array target ports discovered on VPG1. These presented targets (WWPNs) are zoned in with appropriate adapter ports on Server1.

  When LUNs (discovered through VPG2) are presented to Server2, four new presented targets (PT5, PT6, PT7, and PT8) are created. The new presented targets depict the same four source array target ports now discovered through VPG2, creating a total of eight presented targets through the MPX200.

NOTE: HP recommends that if a single-source array FC target port is discovered through one VPG across both blades, you should create only one presented target across all four physical FC blade ports. For example, in Figure 5 (page 12), target ports SA1, SA2, SB1, and SB2 are discovered on both blades through VPG1. Presented targets (PT) PT1 (SA1 + VPG1) and PT4 (SB2 + VPG1) are presented through FC ports on Blade1, and PT2 (SA2 + VPG1) and PT3 (SB1 + VPG1) are presented through Blade2.

Example:

- Four target ports on the source array are zoned in with VPG1 from each MPX blade. Assuming two fabrics, we connect FC1 from each blade to Fabric A and FC2 from each blade to FC2.

Fabric	Zone	VPG1 WWPN	Source Array port WWPN
A	Blade1-FC1-VP1_Zone	21:00:00:c0:dd:13:2c:60	50:05:08:b4:00:b4:78:cc
A	Blade2-FC1-VP1_Zone	21:00:00:c0:dd:13:2c:68	50:05:08:b4:00:b4:78:c8

Fabric	Zone	VPG1 WWPN	Source Array port WWPN
B	Blade1-FC2-VP1_Zone	21:00:00:c0:dd:13:2c:61	50:05:08:b4:00:b4:78:cd
B	Blade2-FC2-VP1_Zone	21:00:00:c0:dd:13:2c:69	50:05:08:b4:00:b4:78:c9

- Using the MPX200 Target Map feature, new Presented Target WWPN's are created for each source array port.

Fabric	Presented out port	Presented Target WWPN	VPG	Source Array port WWPN
A	Blade1-FC1	21:04:00:c0:dd:13:2c:60	1	50:05:08:b4:00:b4:78:cc
A	Blade2-FC1	21:04:00:c0:dd:13:2c:68	1	50:05:08:b4:00:b4:78:c8
B	Blade1-FC2	21:04:00:c0:dd:13:2c:61	1	50:05:08:b4:00:b4:78:cd
B	Blade2-FC2	21:04:00:c0:dd:13:2c:69	1	50:05:08:b4:00:b4:78:c9

During the online migration process the server is zoned with these new Presented Targets to access the LUNs through the MPX200.

Global presentation

When more than 256 LUNs from a single storage array are mapped to a server, you must present these LUNs across multiple VPGs. Each VPG on the MPX200 can see 256 LUNs.

To reduce the number of steps required to create presented targets that represent the same target ports across multiple VPGs, the MPX200 allows you to create a global presented target that spans all virtual port groups (VPG1, VPG2, VPG3, and VPG4). If you need to map a source array target port across more than one VPG, HP recommends that you create a global presented target in the Target Map Wizard.

Global presentation of targets spans all VPGs, and does target mapping for both FC and iSCSI ports. Global presentation, like virtual presentation, is common for all VPGs. A single source array's target port can have a single global and virtual presentation that functions for all VPGs.

Figure 12 Presented Targets: global presentation

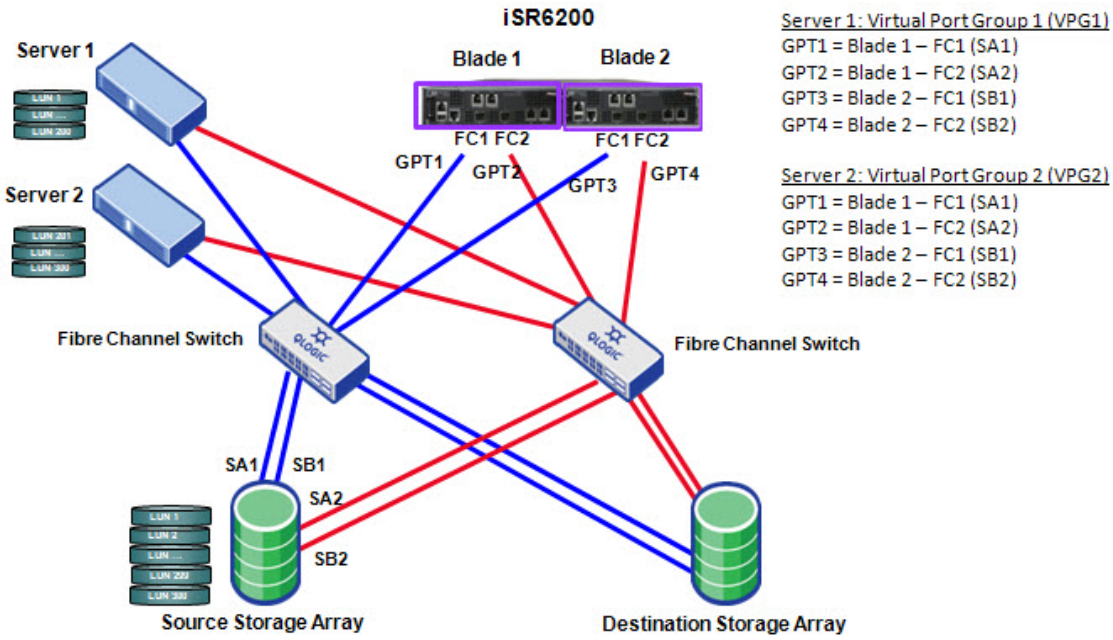


Figure 12 (page 27) shows:

- Four target ports (WWPNs) on the source array are zoned in with two VPGs (VPG1 and VPG2) on the MPX200.
- LUNs associated with VPG1 are for Server1, and LUNs associated with VPG2 are for Server2.
- Four global presented target ports (GPT1, GPT2, GPT3, and GPT4) depict the four source array target ports discovered either on VPG1 and VPG2.

  These presented targets (WWPNs) are zoned in with appropriate adapter ports on Server1, and the same presented targets (WWPNs) are zoned in with the appropriate adapter ports on Server2, creating a total of four presented targets through the MPX200.
- Global Presentation 1 (SA1) and Global Presentation 2 (SA2) are presented through FC ports on Blade1, and Global Presentation 3 (SB1) and Global Presentation 4 (SB2) are presented through Blade2.

NOTE: Do not use global presentation and LUN masking together. To use global presentation, issue the `lunremap` command to mask LUNs. To use the `lunmask add` command, use VPG-specific presentation rather than global presentation.

Example:

- Four target ports on the source array are zoned in with all VPGs from each MPX blade. Assuming two fabrics, connecting FC1 from each blade to Fabric A and FC2 from each blade to FC2.

Fabric	Zone	VPG WWPN	Source Array port WWPN
A	Blade1-FC1-VPG_Zone	21:00:00:c0:dd:13:2c:60 21:01:00:c0:dd:13:2c:60 21:02:00:c0:dd:13:2c:60 21:03:00:c0:dd:13:2c:60	50:05:08:b4:00:b4:78:cc
A	Blade2-FC1-VPG_Zone	21:00:00:c0:dd:13:2c:68 21:01:00:c0:dd:13:2c:68 21:02:00:c0:dd:13:2c:68 21:03:00:c0:dd:13:2c:68	50:05:08:b4:00:b4:78:c8
B	Blade1-FC2-VPG_Zone	21:00:00:c0:dd:13:2c:61 21:01:00:c0:dd:13:2c:61 21:02:00:c0:dd:13:2c:61 21:03:00:c0:dd:13:2c:61	50:05:08:b4:00:b4:78:cd
B	Blade2-FC2-VPG_Zone	21:00:00:c0:dd:13:2c:69 21:01:00:c0:dd:13:2c:69 21:02:00:c0:dd:13:2c:69 21:03:00:c0:dd:13:2c:69	50:05:08:b4:00:b4:78:c9

- Using Global mapping within the MPX200 Target Map feature, new Presented Target WWPN's are created for all VPGs for each source array port.

Fabric	Presented out port	Presented Target WWPN	VPG	Source Array port WWPN
A	Blade1-FC1 Blade2-FC1	21:**04**:00:c0:dd:13:2c:60	1,2,3,4	50:05:08:b4:00:b4:78:cc
A	Blade1-FC1 Blade2-FC1	21:**04**:00:c0:dd:13:2c:68	1,2,3,4	50:05:08:b4:00:b4:78:c8
B	Blade1-FC2 Blade2-FC2	21:**04**:00:c0:dd:13:2c:61	1,2,3,4	50:05:08:b4:00:b4:78:cd
B	Blade1-FC2 Blade2-FC2	21:**04**:00:c0:dd:13:2c:69	1,2,3,4	50:05:08:b4:00:b4:78:c9

- A single Global Presented Target WWPN may now present LUNs from any VPG using the `lunremap` command.

Migration to a thin-provisioned LUN

The MPX200 provides the option to create a data migration job to a thin-provisioned destination LUN.

The MPX200 detects thin-provisioned storage based on SCSI Read capacity commands. Some storage arrays, even though they support thin provisioning, may not indicate the support for thin-provisioned storage in the SCSI Read Capacity response.

For migration from regular, thick-provisioned LUN, to thin-provisioned storage, HP recommends using a space-reclamation tool on the source LUN. Space-reclamation utilities help maximize the capacity savings on the new, thin-provisioned storage.

Recommended steps

HP recommends that you run the SRU on a file system volume prior to configuring a migration job for a thin-provisioned destination LUN. Follow these steps to migrate to a thin-provisioned storage:

1. Run the SRU on the file system volumes that are to be migrated using the MPX200.
2. Follow either the online or offline data migration procedure.

The migration to thin-provisioned storage option (TP settings in HP mpx Manager) has three values:

- **No TP:** The destination LUN is not thin-provisioned; this is the default value.
- **Yes, and No Validation:** Select this option when the destination LUN is known to be a thin-provisioned storage and is known to contain all zeroes or is newly created.
- **Yes and TP Validation:** Select this option if you are uncertain about the data on the destination LUN, or if the destination LUN was used earlier for storing any other data. Enabling validation ensures that no corruptions exist because of stale data on the destination LUN. Enabling validation creates additional processing overhead. Typically, validation is not required for a newly created destination LUN for data migration. For remote online and offline data migration, HP does not recommend thin-provisioning and validation.

DML

The MPX200 uses a DML to support remote migration (asynchronous replication). The DML:

- Is a critical component to support remote migration.
- Must be allocated from a highly available storage array on a local SAN.
- Must be accessible from both MPX200 blades.
- Must be accessible through multiple paths to each blade.
- Requires a minimum user capacity of 100GB (recommended), which supports up to 64 remote migration jobs (active, scheduled, or configured) on a single MPX200 across both blades.

DML size, see Table 5 (page 30), depends on the data change rate and how many concurrent migration jobs are active. More than 64 remote migration jobs require a minimum of 1GB additional user capacity for each additional job. Typically, a 164 GB DML can hold 128 DRLs. You can dynamically add up to eight LUNs in the DML pool. To remove the DML from the pool, ensure that all remote migration jobs are completed or removed. Each LUN in a DML pool must be smaller than 2TB.

Table 5 Data migration size

Number of Remote Migration Jobs per MPX200	Minimum Required DML Capacity
64	100 GB
128	164 GB
256	292 GB
512	548 GB

For more information on working with DMLs, refer to "Creating and removing a DML" (page 69) and "Command line interface" (page 76).

Remote peers

A remote peer identifies the remote router used at a remote site. The remote router establishes native IP connectivity to perform remote data migration operations. "Using remote peers" (page 51) provides procedures for adding and removing remote peers.

Online remote migration

Remote data migration with the MPX200 uses either Native IP connectivity or FCIP. Because the MPX200 uses an asynchronous replication method to migrate data online to a remote location, the router requires a DML, see "Creating and removing a DML" (page 69). The MPX200 uses the DML to record all the changes during the remote migration process. The DML must be allocated from any storage array in a local SAN. For DML allocation guidelines, refer to the previous section, "DML" (page 29).

NOTE: For details about the WAN link between the local and remote sites, refer to the *HP MPX200 Multifunction Router Command Line Interface User Guide*. The WAN link test command helps identify possible WAN issues such as packet drops, jitter, available bandwidth, and so on, and enables the migration user to adjust the WAN accordingly.

Deploy the MPX200 for data migration at a local location where the source data resides. Before configuring any remote data migration job, allocate the DML to the MPX200 system from the local site (source location). To add or delete a DML, see the procedures in "Creating and removing a DML" (page 69)1. Use one of the following methods to perform remote migration.

Method 1: Using Native IP

Online remote data migration with Native IP has the following objectives:

- To reduce and simplify the configuration steps required for implementing a remote data migration.
- To improve the performance of remote migration using compression.

Configuring the Router and Chassis

Follow these procedures to configure the remote and local routers and chassis for online remote data migration with Native IP.

To configure the remote router and chassis:

1. Present the LUNs to be used as part of the migration from the destination array to the remote router and blade VPGs.
2. If the destination array has been moved from the local site to this remote site, add the remote router and blade VPGs in the same host group as the local router and blade VPGs. This step ensures that LUNs are visible to the remote router at the same LUN IDs.
3. Zone in the destination array ports with the appropriate VPGs.
4. Ensure that the targets and LUNs are visible on the remote router.

5. Configure IP addresses for the router's iSCSI ports by entering an IP address:
   - In mpx Manager, modify the iSCSI Port Information page.
   - In the CLI, issue the `set iscsi` command (see"set iscsi" (page 110).

To configure the local router and chassis:

1. Take these preliminary steps:
   a. Ensure that the local router and chassis have access to the source array.
   b. Ensure that the LUNs are visible.
   c. Create a data management LUN , see "Creating and removing a DML" (page 69).
   d. Configure any potential migration jobs using the destination array (local).
   e. If the destination array was initially present at the local site and then moved to a remote site after the initial copy, ensure that the migration jobs are in a COPY COMPLETE state.
2. Assign IP addresses to the routers iSCSI ports by issuing the `set iscsi` command , see "set iscsi" (page 110).
3. Ensure IP connectivity between the routers by checking for the following:
   - The local router's MGMT. port can ping the remote router's MGMT. port.
   - The local router's network ports can ping the remote router's iSCSI ports.
4. On each local router blade and chassis, issue the `remotepeer add` command, for details see "remotepeer" (page 101), and then specify the management port of the remote router. This step ensures that the remote router has access to the destination array ports and can communicate using the specified Ethernet ports.

   HP recommends the following connections:
   - Blade 1 of the local chassis establishes as the peer Blade 1 of the remote chassis.
   - Blade 2 of the local chassis establishes as the peer Blade 2 of the remote chassis.
5. Validate the configuration by executing the `show remotepeers` command, see "show remotepeers" (page 132).
6. On each blade, issue the `array import` command, see "array" (page 77), and then specify the array to be imported. The imported array is automatically marked as a destination array.
7. Ensure that the array has been imported successfully by issuing the `show array` command, see "show array" (page 112), and then validating the LUN information.

   Each blade should see all of the paths that are available on the peer. However, only the paths that are online on the peer are online locally.

Adding a Migration Job and resuming an existing Migration Job

You can add a remote migration job using an imported array. You can also enable and disable compression for the migration job.

If a remote migration job was previously running and the array comes online with the LUNs involved in the migration, the migration job automatically resumes operation.

For an example of using Native IP to add a remote peer, see "remotepeer" (page 101).

To remove an imported array, see "Removing an offline array" (page 69).

Native IP remote migration firewall ports

With Native IP remote migration it may be necessary to open specific ports if a firewall is used in the network. Table 6 (page 32) describes the ports that are needed to communicate with the MPX from the mpx management GUI as well as native IP communications between the local and remote MPX.

Table 6 Native IP remote firewall ports

Description	Direction	Port	Protocol
FTP	Bi-directional	20	TCP/UDP
SSH	Unidirectional	22	TCP
MPX Manager (PortMapper)	Bi-directional	111	TCP/UDP
SNMP	Unidirectional	162	UDP
RPCserver	Bi-directional	617	TCP/UDP
RPCserver	Bi-directional	715	TCP/UDP
RPCserver	Bi-directional	717	TCP/UDP
RPCserver	Bi-directional	729	TCP/UDP
RPCserver	Bi-directional	731	TCP/UDP
RPCserver	Bi-directional	1014	TCP/UDP
iSCSI	Bi-directional	3260	TCP

Method 2: Using a fat pipe between local and remote data center

Scenario: Source array at local data center; destination storage array at remote data center; *fat pipe* (a high-capacity WAN link) with dedicated bandwidth for migration between the two locations. This method requires a minimum of 600 Mbps of dedicated IP link between the two data centers; the method also requires the change rate be less than 15 MBps.

Best Practices:

- Allocate a sufficient amount of dedicated bandwidth (used for data migration) between local and remote data centers. The minimum bandwidth should be four times the data change rate for round-trip latencies less than 25 ms. For higher round-trip latencies between two sites, increase the multiplier. For example, if the data change rate for the data actively under migration is 15 MBps, the minimum dedicated bandwidth should be either 60 MBps or 600 MBps link rate when RTT latencies are less than 25 ms. For a RTT of 100 ms, allocate a 1000 MBps link. HP recommends a dedicated bandwidth of 1000 MBps or greater between two remote sites. For additional details and bandwidth calculator, see the *Data Migration Service for iSR6200 Planning Guide - ISR654607-00 D*.
- Ensure that dedicated IP bandwidth between two sites is available for data migration throughout the migration job.
- When using SAN over WAN, configure a large TCP window size on both SAN over WAN routers.
- For iSCSI migrations, configure a large TCP window on MPX200 iSCSI ports and the target ports on the iSCSI storage array. Configure TCP window size on the MPX200 by issuing the CLI command `set iscsi`. Calculate the typical window size in KB as follows:

  WAN link bandwidth in MBps × RTT in ms
  Divided by the number of iSCSI connections between the MPX200 and iSCSI target port of the storage array

  For example, suppose the available WAN link bandwidth is 100 MBps (1000 MBps), the RTT is 20 ms, and there are two iSCSI connections between the MPX200 blade and the iSCSI target ports on the storage array:

  (100 × 20) / 2 = 1000 KB TCP window size

  Configure 1 MB window size on the MPX200 and iSCSI target port. The MPX200 supports a maximum TCP window size of 16 MB. An iSCSI target array port may support larger TCP window sizes.

- For iSCSI migrations, set the migration I/O size to 64 K.
- Use only new destination LUNs to select the recommended (and better performing) TP and No Validation option under TP Settings when creating the migration job.
- If migrating to a thin-provisioned storage, always allocate destination LUN first. HP does not recommend the Yes and TP validation option under TP Settings when creating the migration job.
- Schedule and start remote migration jobs at off peak hours, so that a small number of dirty regions are generated, and most of the WAN bandwidth is available to perform the initial data copy.
- Follow the guidelines for DML size. Selecting the Yes and TP validation option can result in a long migration time and may require more bandwidth between two sites.
- To ensure faster migration, migrate storage for a few servers at a time.

Data scrubbing

The data scrubbing feature provides a method of securely wiping out data on a LUN. This feature implements several U.S. DoD specifications, including the number of passes and the data pattern written. Each pass starts at the beginning of the LUN and completes after the I/O to the last LBA of the job is completed.

The current firmware release provides the following algorithms and passes:

- **ZeroClean:** Two passes
- **DOD_5220_22_M:** Four passes
- **DOD_5220_22_M_E:** Four passes
- **DOD_5220_22_M_ECE:** Eight passes

Data scrubbing job attributes

Data scrubbing for data migration includes the following:

- **Source LUN:** Indicates the LUN that needs to be scrubbed. The source LUN for a scrubbing job must not be mapped to a host and must not be part of another job.
- **Job Group:** Same as data migration job groups.
- **Scrubbing Algorithm:** As noted in the previous section.
- **Scheduling:** Same as data migration job scheduling.
- **Scrubbing CurrentPass:** Specifies the currently active pass for a scrubbing job.

Data scrubbing protections

Data scrubbing protections include the following:

- The scrubbing job configuration wizard only shows LUNs that are part of a *Source* or *Source+Destination* array.
- Job configuration on LUNs that are mapped to an initiator or part of a migration job is not allowed.
- LUN presentation of a LUN that is part of a scrubbing job will fail.
- An additional confirmation is required while configuring a scrubbing job.

Data scrubbing logs

Data scrubbing jobs generate logs for every user configuration event, as well as for job STARTING, FAILING or COMPLETION. You can view data scrubbing logs using the same interface as used for migration logs, see **"Viewing system and data migration job logs" (page 63)**.

Data scrubbing licenses

Data scrubbing license keys are based on an MPX200 blade serial number. The licenses are shared between two blades in the same MPX200 chassis. The two data-scrubbing license types are:

- Capacity-based licenses
- Array-based licenses

NOTE: Data scrubbing jobs up to 5 GB currently do not require a license.

Protection

DMS provides data protection against some of the common user errors by enforcing the following restrictions:

- An array must have an attribute of either Source, Destination, or Source+Destination to participate in the migration. When you configure a data migration job, Source LUNs can be assigned only from an array with the attribute Source (or Source+Destination), and Destination LUNs can be assigned only from an array with the attribute Destination (or Source+Destination). Use these attributes properly to avoid errors.
- A user acknowledgement is required for a data migration job after the job is completed. This feature provides better accounting and record-keeping for the job. The data migration log indicates when the job was completed and when you acknowledged the completion status of the job.
- For *online* or *offline* data migration, after a LUN is configured as a destination LUN for a specific data migration job, the LUN cannot be configured for a different job until the current job is acknowledged or removed.
- DMS detects the normal configuration of Windows OS partitions on the data LUN. Before fully configuring a data migration job, DMS provides a warning if it detects valid partition tables on the destination LUN.

Logs

DMS manages the following two log types:

- **Migration logs:** Migration logs provide a detailed history of each data migration job. The job history contains information such as the start and end time of the job, source and destination LUNs and arrays, size of the job, total time consumed for the job, and so on. Using HP mpx Manager, you can export the migration logs out of the MPX200. You can open this file with a spreadsheet application such as Microsoft Excel and use it as a data migration task report. HP highly recommends that you save migration logs after the data migration job is completed and cleared from the MPX200. This task provides a record of every data migration job and makes it easier to differentiate between them.
- **System logs:** System logs primarily record events, errors, and configuration changes, and can be used for troubleshooting.

Users

The MPX200 supports two types of users:

- **Administrative user (`admin`):** For managing the MPX200, you must be in an administrative session. The default password for the administrator is `config`.
- **Data migration user (`miguser`):** This user session is required to configure migration-related activities. The default password is `migration`.

Host

A *host* is a logical construct consisting of one or more initiator ports for one or more protocols. The host simplifies the configuration process and prevents configuration errors during LUN masking by:

- Representing a single server with one or many FC or iSCSI ports.
- Representing one or many servers, each with one or many FC or iSCSI ports. Servers are used in a cluster environment where the same LUNs must be presented to multiple servers and cluster hosts.
- Being available across the blades of a chassis.

Host attributes include the following:

- Symbolic name, which must be unique chassis-wide, identifies the host.
- OS type indicates the current OS type from initiator ports to be moved to the host. The initiator ports inherit the OS type from the host. A change in the host OS type reflects in all the initiator ports that are part of the host.
- Host state is either *online* (one or more initiator ports are logged in) or *offline* (all initiator ports are logged out).

NOTE: If the host has LUN mapping on its initiators, the mapping to the host is removed when you remove all the initiators.

A host without initiators cannot be mapped to LUNs.

4 Data migration licenses

This chapter provides information on data migration licenses including license types, license installation, and license use.

Types of data migration licenses

Data migration license keys are based on an MPX200 blade serial number. The licenses are shared between two blades in the same MPX200 chassis. The two types of data migration licenses are capacity-based and array-based.

Capacity-based licenses

Capacity-based licenses allow you to migrate data up to a specific limit designated by the applied license key. This type of license is available in variants of 1 TB and 5 TB capacities, which can be consumed by one or more migration jobs that you create. Every time you configure a data migration job, the available capacity is reduced by an amount equivalent to the size of the source LUN being migrated. The MPX200 does not allow you to add migration jobs when the job size exceeds available migration licenses.

Array-based licenses

For large storage arrays, array-based licenses are more cost effective than Capacity-based licenses. Array-based licenses allow you to migrate unlimited amounts of data to and from the specific array that is licensed. This license SKU is available as a single-array license SKU. You may purchase multiple single-array license SKUs, generate license keys, and load them on the MPX200. Each single-array license can be tied to a specific array. The licensed array may be used as either a source or destination array while configuring jobs for data migration.

Array-based licenses allow you to migrate data in and out of the specified licensed array. For example, consolidating three or four source arrays onto a single destination array requires only one single-array license on the destination array.

You would consume multiple single-array licenses under the following conditions:

- Each single array license is valid for one MPX200 chassis. If you have storage arrays with a large number of ports (for example, EMC DMX, HP-XP, and so on) and want to use multiple MPX200s for data migration, you must purchase multiple single-array license keys for each MPX200.
- If you present one set of LUNs to the MPX200 from the same array from one set of storage array ports, and also present a second set of LUNs to the same MPX200 from the same array from a different set of storage array ports, the MPX200 detects the LUNs as two different arrays. You must purchase multiple single-array licenses for the same storage array.

Types of data scrubbing licenses

Data scrubbing license keys also include capacity-based and array-based licenses.

Capacity-based licenses

Capacity-based data scrubbing licenses allow you to scrub the data up to the licensed capacity. A capacity-based license is consumed based on the size of the data LUN being scrubbed. For example, if you have a 5 TB data scrubbing license and scrub a 500 GB LUN, 500 GB of the license is consumed and 4,500 GB of the license remains available for future use.

Array-based licenses

Array-based data scrubbing licenses allow you to scrub all LUNs within that array, regardless of array capacity. An array-based license is consumed when it is allocated to a specific array.

Installing a data migration license key

Follow this procedure to install a data migration license key using HP mpx Manager.

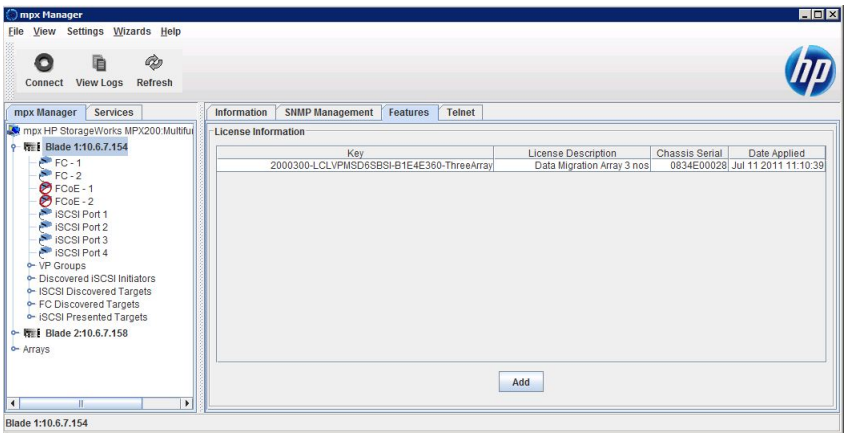
To install a data migration license key:

1. In the HP mpx Manager main window, click the **Router** tab in the left pane.
2. In the left pane, click **Router MPX200**, and then select the blade on which to install the license key.

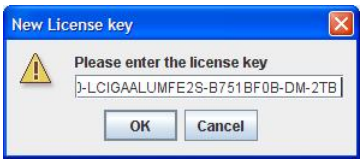
   NOTE: The License key is generated from the blade serial number. Install the license on the blade used to generate the key. The license is then shared by both blades.

3. In the right pane, click the **Features** tab.
4. On the Features page under **License Information**, click **Add**, as shown in Figure 13 (page 37).

Figure 13 Features page: license information

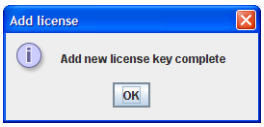


The New License Key dialog box opens.



5. Enter a valid DM license key, and then click **OK**.

   The **Add license** dialog box indicates the success of the license add operation:



6. Click **OK** to close the verification dialog box.
7. Verify that the newly added key appears in the list of keys on the Features page, as shown in Figure 13 (page 37).

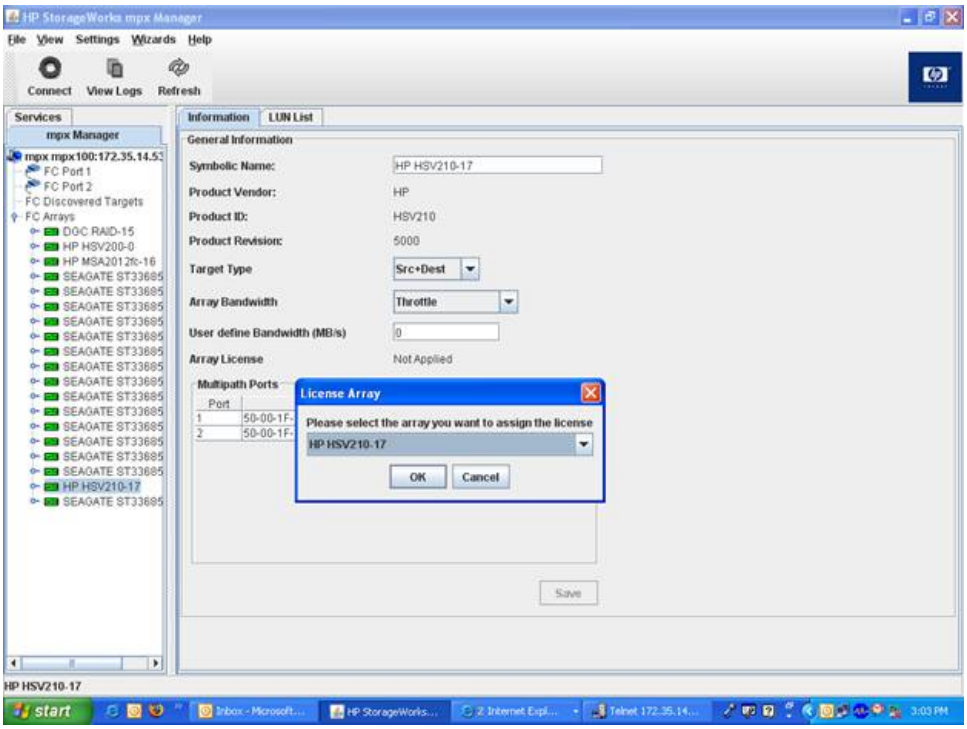
Applying an array-based license to a specific array

You can apply an array-based license to a specified storage array using either HP mpx Manager or the CLI. If you have purchased array-based licenses and installed the licenses in the MPX200, follow these steps to license a specific array for data migration. For every array that is licensed, one license is consumed.

To apply an array-based license to a specific array in the GUI:

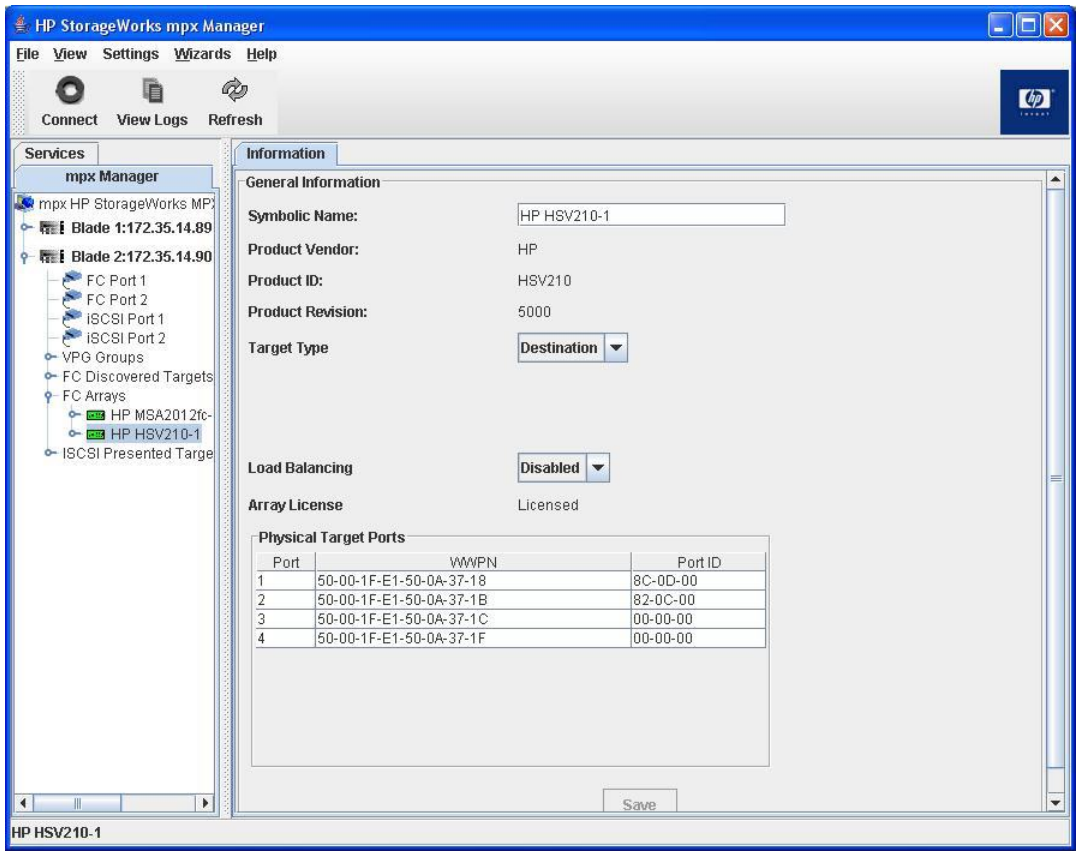
1. In the left pane of the HP mpx Manager main window, click the **Router** tab.
2. On the Wizards menu, click **License an Array**.
3. In the left pane under **Arrays**, click the name of the FC or iSCSI array to which to apply the license.
4. In the License Array dialog box, select the array for which you want to apply the license, see Figure 14 (page 38), and then click **OK**.

Figure 14 License Array dialog box



The **Information** page for the selected array now shows **Licensed** in the **Array License** field, see Figure 15 (page 39).

Figure 15 Information page showing array is licensed



Viewing data migration and scrubbing license usage

You can view the usage for the data migration and scrubbing licenses from either HP mpx Manager or the CLI. In addition, you can create a report containing the license usage information.

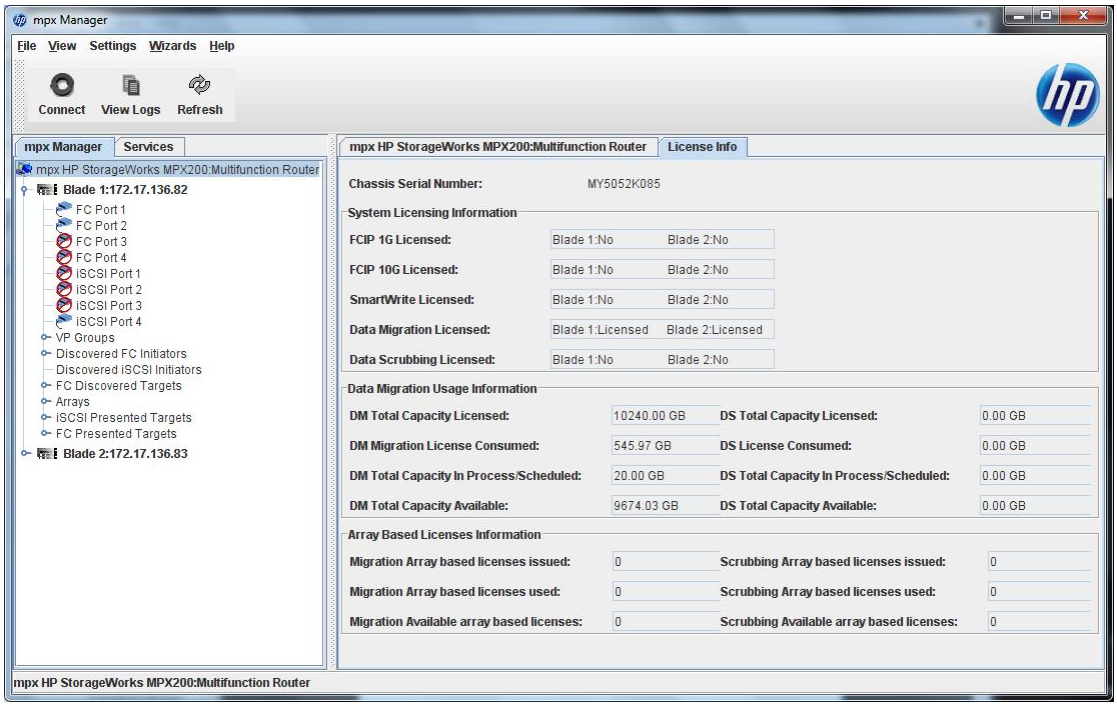
Follow these procedures to view the usage of data migration and scrubbing licenses in the GUI; to view the licenses in the CLI, see "show migration_usage" (page 129). You can view license usage for either the chassis or a blade.

To view data migration license usage for the chassis:

1. In the left pane of the HP mpx Manager main window, click the **Router** tab.
2. In the left pane, select the router name.
3. Click the **License Info** tab.

   License usage appears on the License Info page, as shown in Figure 16 (page 40).

Figure 16 License info for the chassis

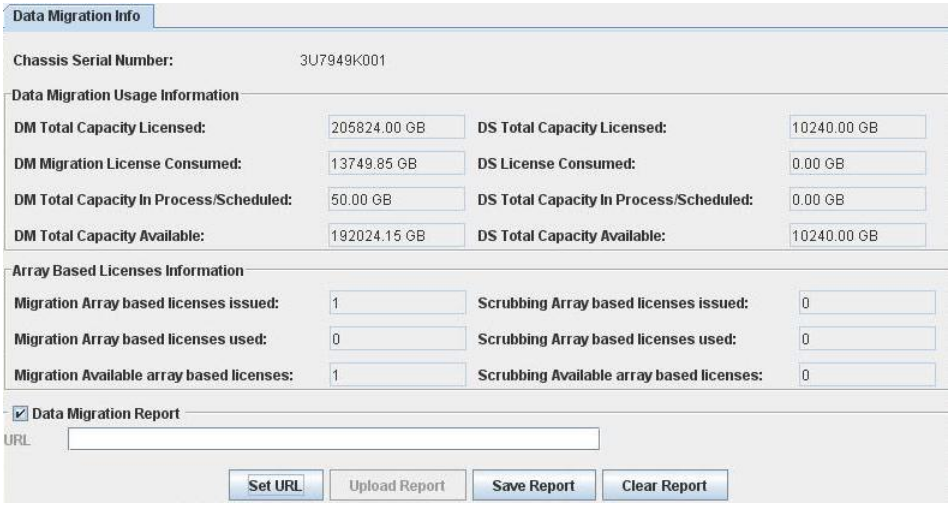

mpx Manager
File View Settings Wizards Help
Connect View Logs Refresh
mpx Manager Services
mpx HP StorageWorks MPX200:Multifunction Router
Blade 1:172.17.136.82
FC Port 1
FC Port 2
FC Port 3
FC Port 4
iSCSI Port 1
iSCSI Port 2
iSCSI Port 3
iSCSI Port 4
VP Groups
Discovered FC Initiators
Discovered iSCSI Initiators
FC Discovered Targets
Arrays
iSCSI Presented Targets
FC Presented Targets
Blade 2:172.17.136.83
mpx HP StorageWorks MPX200:Multifunction Router
License Info
Chassis Serial Number: MY5052K085
System Licensing Information
FCIP 1G Licensed: Blade 1:No Blade 2:No
FCIP 10G Licensed: Blade 1:No Blade 2:No
SmartWrite Licensed: Blade 1:No Blade 2:No
Data Migration Licensed: Blade 1:Licensed Blade 2:Licensed
Data Scrubbing Licensed: Blade 1:No Blade 2:No
Data Migration Usage Information
DM Total Capacity Licensed: 10240.00 GB
DS Total Capacity Licensed: 0.00 GB
DM Migration License Consumed: 545.97 GB
DS License Consumed: 0.00 GB
DM Total Capacity In Process/Scheduled: 20.00 GB
DS Total Capacity In Process/Scheduled: 0.00 GB
DM Total Capacity Available: 9674.03 GB
DS Total Capacity Available: 0.00 GB
Array Based Licenses Information
Migration Array based licenses issued: 0
Scrubbing Array based licenses issued: 0
Migration Array based licenses used: 0
Scrubbing Array based licenses used: 0
Migration Available array based licenses: 0
Scrubbing Available array based licenses: 0
mpx HP StorageWorks MPX200:Multifunction Router

To view data migration license usage for the blade:

1. In the left pane of the HP mpx Manager main window, click the **Services** tab.
2. In the left pane, under Router MPXxxx, select a blade node.

   License usage appears on the License Info page, as shown in Figure 17 (page 40).

Figure 17 Data migration info for a blade


Data Migration Info
Chassis Serial Number: 3U7949K001
Data Migration Usage Information
DM Total Capacity Licensed: 205824.00 GB
DS Total Capacity Licensed: 10240.00 GB
DM Migration License Consumed: 13749.85 GB
DS License Consumed: 0.00 GB
DM Total Capacity In Process/Scheduled: 50.00 GB
DS Total Capacity In Process/Scheduled: 0.00 GB
DM Total Capacity Available: 192024.15 GB
DS Total Capacity Available: 10240.00 GB
Array Based Licenses Information
Migration Array based licenses issued: 1
Scrubbing Array based licenses issued: 0
Migration Array based licenses used: 0
Scrubbing Array based licenses used: 0
Migration Available array based licenses: 1
Scrubbing Available array based licenses: 0
Data Migration Report
URL
Set URL
Upload Report
Save Report
Clear Report

5 Performing data migration

This chapter provides a number of procedures for configuring and managing data migration using DMS.

Typical data migration process

Table 7 (page 41) and Table 8 (page 42) show the MPX200 data migration process flow by category and activity, and references the appropriate section for each.

Table 7 Online data migration process flow

Category	Activity	For more information, see…
Pre-migration	1. Plan for data migration.	*Data Migration Service for MPX200 Planning Guide*
	2. At the start of the project, clear the migration logs.	"Viewing system and data migration job logs" (page 63)
	3. Verify the pre-installed data migration license or install a license key, then apply the array-based license key, if an array-based migration license will be consumed for this project. Otherwise, a per-TB license is used automatically.	"Installing a data migration license key" (page 37) and "Applying an array-based license to a specific array" (page 37)
	4. Configure the FC fabric.	"Configuring the fabric" (page 42)
	5. Provide the MPX200 access to LUNs from source and destination arrays.	"Presenting LUNs to the MPX200" (page 43)
	6. Discover arrays and set array properties.	"Setting array properties" (page 53)
	7. Configure automatic failover for high availability.	"Job failover and failback" (page 23)
	8. Define user groups.	"Creating a data migration job group" (page 55)
	9. Map source array LUNs to one or more hosts. For online remote migration, also create a data management LUN.	"Presenting LUNs to the server for online data migration" (page 46)
	10. Create presented targets to map source array target ports with MPX200 Fibre Channel ports.	"Step 2: Create presented targets" (page 47)
	11. Insert the MPX200 in the server data path and zone out direct paths from servers to the source storage array.	"Step 1: Inserting the MPX200 in the server data path for online data migration" (page 46)
Configure migration jobs	12. Configure and validate data migration jobs.	"Using the data migration wizard" (page 55)
Migrate and monitor	13. For data migration jobs that are scheduled for a delayed start, specify the start time for the job.	"Starting serial scheduled jobs" (page 60)
	14.Monitor data migration jobs.	"Viewing job details and controlling job actions" (page 62)
	15. Acknowledge the data migration jobs.	"Acknowledging a data migration job" (page 67)
Post-migration	16. Export data migration logs.	"Viewing system and data migration job logs" (page 63)

Table 7 Online data migration process flow *(continued)*

Category	Activity	For more information, see…
	17. Remove arrays from persistence.	"Removing an offline array" (page 69)
	18. Check license usage.	"Viewing data migration and scrubbing license usage" (page 39)

Table 8 Offline data migration process flow

Category	Activity	For more information, see…
Pre-migration	1. Plan for data migration.	*Data Migration Service for MPX200 Planning Guide*
	2. At the start of the project, clear the migration logs.	"Viewing system and data migration job logs" (page 63)
	3. Verify the pre-installed data migration license or install a license key, then apply the array-based license key, if an array-based migration license will be consumed for this project. Otherwise, a per-TB license is used automatically.	"Installing a data migration license key" (page 37) and "Applying an array-based license to a specific array" (page 37)
	4. Configure the FC fabric.	"Configuring the fabric" (page 42)
	5. Provide the MPX200 access to LUNs from source and destination arrays.	"Presenting LUNs to the MPX200" (page 43)
	6. Discover arrays and set array properties.	"Setting array properties" (page 53)
	7. Configure automatic failover for high availability.	"Job failover and failback" (page 23)
	8. Define user groups.	"Creating a data migration job group" (page 55)
Configure migration jobs	9. Configure and validate data migration jobs.	"Using the data migration wizard" (page 55)
Migrate and monitor	10. Ensure that the server no longer has access to source LUNs.	"Data migration configuration" (page 11)
	11. For data migration jobs that are scheduled for a delayed start, specify the start time for the job.	"Starting serial scheduled jobs" (page 60)
	12.Monitor data migration jobs.	"Viewing job details and controlling job actions" (page 62)
	13. Acknowledge the data migration jobs.	"Acknowledging a data migration job" (page 67)
	14. Export data migration logs.	"Viewing system and data migration job logs" (page 63)
	15. Remove arrays from persistence.	"Removing an offline array" (page 69)
	16. Check license usage.	"Viewing data migration and scrubbing license usage" (page 39)

Configuring the fabric

Because MPX200 online data migration presents multiple virtual FC ports to each physical FC port, enable NPIV support on the FC switches. If the FC switches (older 2 Gb FC switches) do not support NPIV, or if you do allow the switch to be configured with NPIV support, enable loop mode support on an FC switch port, then configure the MPX200 FC ports in loop-preferred or loop-only mode. The default is loop-preferred.

If NPIV is not supported or not enabled and if the FC switch port cannot be configured to support loop mode, configure MPX200 ports in point-to-point only mode. In point-to-point only configuration of MPX200 FC ports, you can perform only offline migration. NPIV and enabling NPIV support are not options.

Table 9 (page 43) lists the behavior of MPX200 FC ports as determined by the configuration of various FC switch ports, where:

- The **Connect** and **Connect (loop mode)** settings are appropriate for online data migration.
- The **Connect (offline migration only)** setting is appropriate for offline data migration.
- The **No connect** setting indicates that the link does not come up unless you change the MPX200 FC port or switch port setting.

Table 9 FC port settings

	FC switch port setting					
MPX200 FC port setting	**NPIV supported and NPIV enabled**			**NPIV not supported or NPIV disabled**		
	F_Port[1] and FL_Port[2] (P2P[3] or loop)	**F_Port (P2P only)**	**FL_Port (loop only)**	**F_Port and FL_Port (P2P or loop)**	**F_Port (P2P only)**	**FL_Port (loop only)**
P2P only	Connect	Connect	No connect	Connect (offline migration only)	Connect (offline migration only)	No connect
Auto (default)	Connect	Connect	Connect (loop mode)	Connect (loop mode)	No connect	Connect (loop mode)
Loop only	Connect (loop mode)	No connect	Connect (loop mode)	Connect (loop mode)	No connect	Connect (loop mode)

[1] Fabric port

[2] Fabric loop port

[3] Point-to-point

Presenting LUNs to the MPX200

Data migration requires that LUNs from both the source and destination storage arrays be presented to the MPX200 from either FC arrays or iSCSI arrays.

When presenting LUNs to the MPX200 FC ports, you must not present LUNs from different arrays using the same World Wide Unique LUN Name. The MPX200 uses the WWULN of a presented LUN to determine the number of paths available to a specific array entry. Adding LUNs from different arrays using the same WWULN as an existing presented LUN to the MPX200 prevents the MPX200 from creating a new array entry.

The following example shows typical MPX200 LUN information:

```
LUN Information

_______________
WWULN 60:05:08:b4:00:0b:15:a2:00:00:b0:00:00:12:00:00
Serial Number P5512G39SWN0NE
LUN Number 3
VendorId HP
ProductId HSV300
ProdRevLevel 0005
Portal 0
Lun Size 102400 MB
Lun State Online
```

Do not modify the WWULN of a LUN that is to be presented to the MPX200. To create a WWULN specific to that array, use regular LUN creation procedures.

LUN presentation from FC arrays

This section provides the procedures for presenting LUNs and discovering FC storage arrays for data migration.

To present source and destination LUNs from FC arrays:

1. Zone in source array controller ports with appropriate MPX200 VPGs (for more information, see "VPG" (page 24). Create and activate Zone 3 and Zone 4 as shown in Figure 5 (page 12) such that each router blade can access all ports on source array controllers A and B.
2. Zone in destination array controller ports with MPX200 FC ports. Create and activate Zone 5 and Zone 6 as shown in Figure 4 (page 12) such that each router blade can access all ports on destination array controllers A and B.
3. Present LUNs from both the source and destination array to the MPX200 as follows:
   a. Register the following router FC WWPNs from the same VPG as a single "host entry" in the storage array:

      BL1–FC1–VPG1
      BL1–FC2–VPG1
      BL2–FC1–VPG1
      BL2–FC2–VPG1

      For more information on configuring VPGs on an FC array, see the chapter on configuration in the *HP MPX200 Multifunction Router User Guide*.
   b. In the array management utility, set the VPG host type to either Windows or HP-UX. For 3PAR router host entry set Persona to 2.
   c. For online migration with an HP-UX host, register the router's VPG host with the same host platform options as used by the actual HP-UX host under migration. To determine these options, refer to the array management software where the HP-UX host is registered, which provides access to the storage LUNs.
   d. Present the LUNs (associated with the server) to the router. If you are migrating multiple servers at the same time using the same MPX200, and different LUNs are presented from the storage array using the same LUN IDs to different servers, then present the LUNs to the MPX200 at any ID. While presenting the LUN to the server through the MPX200, use the LUN remapping feature.

NOTE: For multiple server migration, assign LUNs to these host as the same LUN ID. For example, a Windows host can see a LUN at ID 1 and a Linux host can see a different LUN at ID 1. You can assign these LUNs to the MPX200 at any LUN ID. Use the LUN remapping feature to present a LUN at the same LUN ID to multiple hosts (both Windows and Linux, in this example) through the MPX200. For more information, refer to the *Data Migration Service for MPX200 Planning Guide*.

4. (Optional) To discover the newly presented LUNs and form new arrays, if required, follow these steps:
   a. In the left pane of HP mpx Manager, click the **Router** tab.
   b. Right-click the appropriate blade.
   c. On the shortcut menu, click **Rescan**.

NOTE: The MPX200 supports a maximum of four VPGs. To expose more than 256 LUNs (numbered from 0 to 255) from any FC storage array that allows no more than 255 LUNs be presented per host, you can enable additional VPGs in the MPX200 blades. To present up to 1,024 LUNs (4×256) from the same array to the MPX200, repeat the preceding steps for each VPG.

In addition, the current firmware supports 1,024 LUNs per VPG for a total of 4,096 (4×1024) LUNs mapped to the MPX200 if all VPGs are enabled. If the array side is limited to mapping a maximum of 256 LUNs to a single host (for example, a host router virtual port), you can map 1,024 LUNs to the MPX200 through four VPGs.

For more information on LUN presentation to the MPX200 through different vendor arrays, refer to the *Data Migration Service for MPX200 Planning Guide*.

LUN presentation from iSCSI arrays

This section provides the procedures for presenting LUNs and discovering iSCSI storage arrays for data migration.

To present source and destination LUNs from iSCSI arrays:

1. Determine the iSCSI initiator name of each blade by entering the `show iscsi` command; see "show iscsi" (page 119).
2. Using the iSCSI array management utility, register the router as a host using the IQN of the iSCSI port, and then assign LUNs to this host.

   NOTE: Some iSCSI arrays require pre-registered hosts for the `iscsi discover` command to succeed. For these arrays, manually create a host with the IQN of the router iSCSI port before you execute the command.

3. Using the CLI, discover iSCSI storage arrays by entering the `iscsi discover` command, see "iscsi" (page 87).
4. List the discovered iSCSI targets, as well any FC targets (if present), by issuing the `show targets` command, see "show targets" (page 134).
5. Log into the iSCSI target by entering the `iscsi login` command, see "iscsi" (page 87).

   After successful iSCSI login, the iSCSI target comes online.

   NOTE: If the iSCSI storage array supports it, you can establish multiple connections per session using multiple GbE ports on the same router blade and storage array.

6. (Optional) To discover the newly presented LUNs and form the new arrays, if required, follow these steps:
   a. In the left pane of HP mpx Manager, click the **Router** tab.
   b. Right-click the appropriate array or target.
   c. On the shortcut menu, click **Rescan**.

Rescanning Targets

To see if one or more data LUNs are exposed to the router ports from the target, you can rescan the target ports. A rescan may cause the router to create an array entity for the target ports through which the router is able to see data LUNs.

To rescan targets:

1. In the HP mpx Manager left pane, right-click the **FC Discovered Targets** node.

2. From the shortcut menu, click **Rescan**. In the left pane under the FC Arrays node, the newly-generated array entity is shown. Alternately, you can click **Refresh** two or three times to rescan the targets and generate the array entity for targets that are exposing LUNs to the router.

Creating a data migration job group

Follow these steps to create a data migration job group in HP Storage mpx Manager:

1. In the left pane, click the **Services** tab to open the **Services** page.

   By default, the MPX200 shows **Group 0** created under the **Data Migration Jobs** item in the left pane.
2. In the left pane, click **Data Migration Jobs**, and then on the shortcut menu, click **Add Group**. (Or on the **Wizards** menu, click **Add Group**.)
3. In the **Create New Group** dialog box, enter a group name that you want to assign to administer a set of data migration jobs, and then click **OK**.
4. In the **Data Migration Security Check** dialog box, enter the data migration user password (default is migration), and then click **OK**.

Presenting LUNs to the server for online data migration

For online data migration, you need to create access to all LUNs associated with the server or servers through the router, and you must eliminate direct access from the server to the storage array.

Follow these basic steps to present the LUNs from the MPX200 to the server:

"Step 1: Inserting the MPX200 in the server data path for online data migration" (page 46)

"Step 2: Create presented targets" (page 47)

"Step 3: Zone in presented targets with initiator ports" (page 48)

Step 1: Inserting the MPX200 in the server data path for online data migration

Map the initiators to the LUN and create presented targets (virtual ports) associated with the source array target ports and the VPG. For more information, see "Presented targets" (page 25).

HP recommends that you create the presented target on the same FC port of the MPX200 on which the source array port is discovered. Typically, FC zoning is set up such that one source array port is discovered through one FC port (one or more VPGs) of the MPX200. If the same source array target port is discovered through multiple FC ports (on the same VPG) of the MPX200, create only one presented target port across both blades of the MPX200.

To present source array LUNs to the initiator for online data migration:

1. Use either the HP mpx Manager or the CLI to create a presented target:
   - In HP mpx Manager, use the Target Presentation/LUN Mapping Wizard to map LUNs to initiators. The LUNs are presented to the initiators at the ID that is available on the MPX200. If the LUN needs to be presented to the initiator with a different LUN ID, select the wizard's **LUN Remap** option as the Presentation Type.

     Because HP mpx Manager performs an array-based LUN presentation, the LUN is presented to an initiator through all of the discovered target ports. The visibility of a LUN through a target on the initiator depends on your zoning configuration.
   - In the CLI, issue the `lunmask add` command, see "lunmask" (page 90) and select the appropriate target and portal. For example:
     - `HBA1 > SA1 > LUN1 > BL1 FC1 VPG1` creates presented target PT1 (SA1 + VPG1)
     - `HBA2 > SB2 > LUN1 > BL1 FC2 VPG1` creates presented target PT4 (SB2 + VPG1)
2. (Optional) To discover the newly presented LUNs and form the new arrays, if required, follow these steps:
   a. In the left pane of HP mpx Manager, click the **Router** tab.
   b. Right-click the appropriate target or array.
   c. On the shortcut menu, click **Rescan**.
3. Repeat the preceding steps for the second blade so that the LUN is accessible to the server through both blades.

Step 2: Create presented targets

If the presented target associated with the source array target port and the VPG does not exist, you must create one using HP mpx Manager or the CLI.

Creating a presented target in the GUI

Use the Target Map Wizard to add a presented target for each source array target port for the VPG from which LUNs are being mapped to the host. Ensure that you create only one presented target (associated with source array target port and the VPG) across both blades and that you include the global target presentation details. The Target Map Wizard provides two methods to create presented targets:

- **Global presentation.** Use this method when the LUN remapping option is used to map LUNs to initiators. Global presentation creates a single presented target for all VPGs (if VPGs are enabled).
- **VPG-based presentation.** Use this method when the LUN mapping option is used with Target Presentation/LUN Mapping Wizard. Select a VPG to create a presented target. LUNs presented through the specified VPG are presented through this presented target. For more information, see "Presented targets" (page 25).

You can use the iSCSI Target Global Present Wizard to manually or automatically create a global presentation for iSCSI targets. With the automatic option, the utility creates the presentation using the WWPN reserved for the system-generated target map. With the manual option, you enter a WWPN for the target map per portal to create a single global presentation for all iSCSI targets.

Creating a presented target in the CLI

As another option, follow these steps to create a configuration using the `targetmap` command in the CLI, see "targetmap" (page 137).

To create presented targets in the CLI:

1. Configure the hosts as follows:

   Host 1:

   1. Present LUNs A, B, and C to the host as LUN IDs 1, 2, and 3.
   2. Present LUNs A, B, and C to the MPX200 VPG1 as LUNs 1, 2, and 3.

   Host 2:

   1. Present LUNs D, E, and F to the host as LUN ID 5, 6, and 7.
   2. Present LUNs D, E, and F to the MPX200 VPG1 as LUN 5, 6, and 7.

   Host 3:

   1. Present LUNs G, H, and I to the host as LUN ID 1, 2, and 3.
   2. Present LUNs G, H, and I to the MPX200 VPG2 as LUN ID 1, 2, and 3.

   This configuration enables MPX200 VPG1 and VPG2 to see all four source array target ports through both blades.
2. Create the following presented targets when presenting the LUNs to Host 1 or Host 2:
   - PT2 is SA2+VPG1
   - PT2 is SA2+VPG1
   - PT3 is SB1+VPG1
   - PT4 is SB1+VPG1
3. Create the following additional presented targets when presenting LUNs to Host 3:
   - PT4 is SA1+VPG2
   - PT5 is SA2+VPG2
   - PT6 is SB1+VPG2
   - PT7 is SB1+VPG2

Step 3: Zone in presented targets with initiator ports

Zone in appropriate presented targets with initiator ports on the server. After completing LUN and target presentation from the MPX200 to the server, follow these recommended steps to insert the MPX200 in the data path and remove direct access between the host and storage array. Depending on the source array type (active-active or active-passive) and configuration (cluster or noncluster), these steps may vary.

NOTE: For information about online insertion of the MPX200 in the data path in a cluster configuration, see the HP application note, *MPX200 Data Migration for Cluster Configurations*.

You can use either one of the methods in this section for single server configuration. In addition, refer to the following:

- For a description of FC zones, Figure 4 (page 12).
- For operating system specific details, refer to "Configuring the data path through MPX200 for online data migration" (page 152).

Zoning in presented targets: Method 1

Source array: active-passive or active-active

Single server configuration: noncluster

This method represents a conservative approach. In this method, you remove one direct path from the source array, and then enable an equivalent path from the MPX200. This method requires multiple zoning steps:

1. Remove SA1 from Zone 1, and then validate the I/O failover to another path.

2. Activate Zone 9, and then validate the new path.
3. Remove SB1 from Zone 1, and then validate I/O failover to another path.
4. Activate Zone 11, and then validate the new path.
5. Remove SA2 from Zone 2, and then validate I/O failover to another path.
6. Activate Zone 10, and then validate the new path.
7. Remove SB2 from Zone 2, and then validate I/O failover to another path.
8. Activate Zone 12, and then validate the new path.

Zoning in presented targets: Method 2

Source array: active-active

Single server configuration: noncluster

Use this method when dealing with arrays that support active-active configuration, where LUNs are accessible simultaneously through both controllers. Such LUNs have paths that are either active-optimized or active-unoptimized. Most 4 Gb FC arrays support such configurations, as do 2 Gb FC arrays from the EMC Symmetrix family, HP XP family, and Hitachi Data Systems USP and 9900 families.

1. Activate Zone 9, Zone 10, Zone 11, and Zone 12.
2. Validate the new paths.
   The paths through MPX200 are enabled.
3. Remove Zone 1 and Zone 2.
   Direct paths are removed.

Mapping LUNs to initiators

HP mpx Manager provides the Target Presentation/LUN Mapping Wizard to map FC and iSCSI initiators to LUNs for online data migration. This mapping provides the access for the LUN to the host from the router through a presented virtual target. Mapping is required as a part of the process of inserting the router in the host I/O path. You must ensure that the entire host I/O is routed by the router, and that there is no direct access to any source controller ports from the host during migration.

NOTE:

- LUN mapping is required only for online data migration for FC and iSCSI initiators. LUN mapping is not required for offline data migration.
- For HP-UX initiators, set the host type to HP-UX in the MPX200. For all other initiators, leave the host type set to **Windows**, the default.
- For arrays that have a dedicated controller LUN (for example, LUN-0 on HP EVA arrays), ensure that LUN-0 is also presented to the FC initiators hosts with the actual data LUNs.

To map an initiator to a LUN:

1. On the Wizards menu, click **LUN Presentation Wizard** to open the Target Presentation/LUN Mapping Wizard.
2. The **LUN Presentation Type** window prompts you to select a presentation type. Select one of the following options, and then click **Next**.
   - **LUN Presentation**
   - **LUN Remap**
3. On the Select the Initiators for LUN Presentation window, select an initiator, and then click **Next**.

4. On the LUN Selection window, select one or more LUNs for the selected virtual port group node, and then click **Next**, or use the LUN remapping feature to remap a LUN to a different ID.

   On the Suggestion window, the router automatically detects the portals through which the array target ports are accessible. HP recommends that you present a single source, array target port, and VPG only once across both blades. Figure 4 (page 12) shows that when source arrays ports SA1, SA2, SA3, and SA4 are discovered on VPG1, only one corresponding presented target is created on PT-SA1, PT-SA2, PT-SA3, and PT-SA4. Although portal selection is not mandatory for LUN presentation, this window suggests that you map targets on the respective FC portals to make the LUNs available to the host.

   NOTE: The Suggestion window appears only when there is no existing mapping. This window does not appear if a target map already exists as part of a previous LUN presentation through this array.

5. On the **Confirm Changes** window, review the LUN mapping, and then click **Next**.

   The LUN Masking Configuration Status opens, and the Security Check dialog box prompts you to enter the administrative password.

6. Type the admin password, and then click **OK**.
7. On the LUN Masking Configuration Status window, review the results of the target ports presented for the selected initiators, and then click **Finish**.

Mapping LUNs to hosts

The Host LUN Presentation Wizard allows mapping LUNs from the source storage array to all the initiator ports configured as a single host, eliminating the requirement for selecting multiple initiators with Initiator LUN mapping. Unlike Initiator LUN mapping, Host LUN mapping is done for both the blades in a single operation.

This mapping provides access for the LUN to the host from the router through a presented virtual target. Mapping is required as a part of the online migration process of inserting the router in the host I/O path. You must ensure that the entire host I/O is routed by the router, and that there is no direct access to any source controller ports from the host during migration.

NOTE: LUN mapping is required only for online data migration for FC and iSCSI initiators. LUN mapping is not required for offline data migration.

For HP-UX initiators, set the host type to HP-UX in the MPX200. For all other initiators, leave the host type set to Windows, the default.

For arrays that have a dedicated controller LUN (for example, LUN-0 on HP EVA arrays), ensure that LUN-0 is also presented to the FC initiators hosts with the actual data LUNs.

To map a source LUN to a Host:

1. On the **Wizards** menu, select **Host LUN Presentation Wizard**.
2. If prompted to select a blade, click **Blade 1** on which to perform the mapping as Host. However, Host LUN presentation is a chassis level feature, so it is going to create LUN mapping on both blades.
3. On the **LUN Presentation Type** window, select **LUN Remap** and then click **Next**.

   NOTE: HP recommends that you use the **LUN Remap** option during LUN Presentation. This makes it mandatory for the user to choose the **Global** option when creating PresentedTarget Maps. The Global Target map eliminates the need to create a presented target for each VPgroup and reduces the number of maps required.

4. On the **Select the Host for LUN Presentation** window, select the host that needs to be assigned LUNs, and then click **Next**.

5. On the **LUN Selection** window, expand the array and VP groups, select one or more LUNs to present, and then click **Next**.
6. On the **Assign LUN ID** window, a default LUN ID is shown corresponding to the Discovered LUN ID presented to the router from the storage array in the **Present LUN ID** column. A new LUN ID may be presented to the Host by editing the Present LUN ID column. Click **Next** to continue
7. On the **Suggestion for Target Map Presentation** window, review the information, and then either click **Next** to continue or click **Back** to change your selections.
8. On the **Confirm Changes** window, review the information, and then click **Next**.
9. On the **Security Check** dialog box, enter the admin password, and then click **Next**.
10. On the **LUN Masking Configuration Status** window, review the results of the target presented for the selected host, then click **Finish**.

Using remote peers

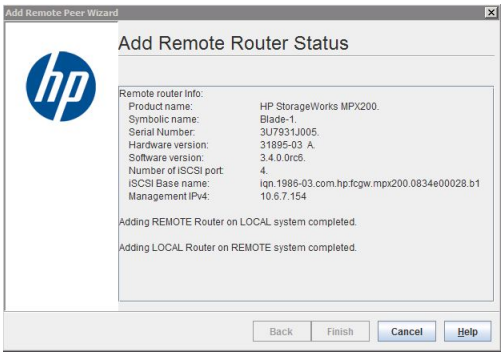
Use remote peers to create a connection between a local and a remote router using the MPX200's iSCSI port. This feature uses the Native IP method for accessing remote MPX200 information on the local MPX200. Use a remote peer when the destination array is located at a different geographic location from the source array.

To add a remote peer:

1. On the Wizards menu, click **Add Remote Peer Wizard**.
2. In the **Select Usage** dialog box, select **Data Migration** as the peer type, and then click **OK**. The Add Remote Peer Wizard opens and prompts you to **Enter the remote Router's IP address**.
3. In the **IPv4 Address** box, type the IP address of the management port for the remote peer router to be added, and then click **Next**.
4. In the **Select Remote iSCSI IP** dialog box, select an iSCSI IP address from the remote peer router, and then click **OK**, or click **Cancel** to abandon the remote iSCSI address selection.
5. In the **Select Local iSCSI IP** dialog box, select an iSCSI IP address from the local router, and then click **OK**, or click **Cancel** to abandon the local iSCSI address selection.
6. In the **Remote Router Admin Password** dialog box, type the administrator password for the remote router, and then click **OK**.

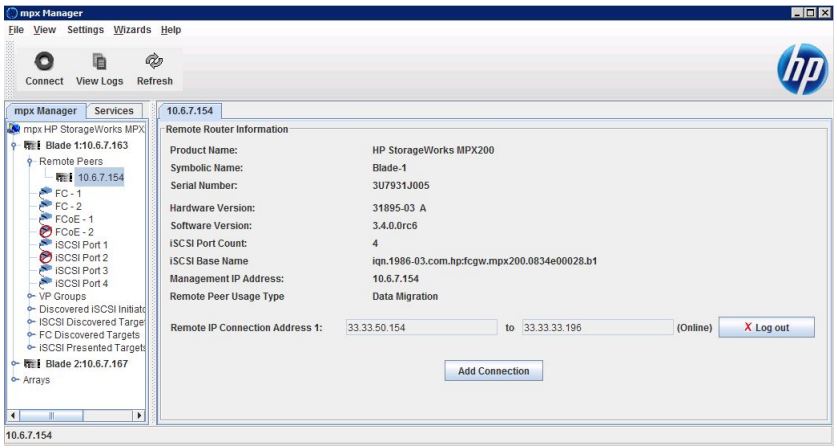
7. In the **Add Remote Router Status** window, review the remote router configuration, and then click **Finish**.

Figure 18 Add Remote Router Status window



8. To view information about the newly added remote peer router, select the remote peer node in the router tree. Figure 19 (page 52) shows an example.

Figure 19 View remote peer router information



To remove a remote peer:

1. On the **Wizards** menu, click **Remove Remote Peer Wizard**. The Remove Remote Peer Wizard opens and prompts you to **Select a remote router to unmap**.
2. Select the check box for the remote router that you want to remove, and then click **OK**.
3. In the LOCAL Router Admin Password dialog box, type the administrator password for the remote router, and then click **OK**.

Importing a remote array

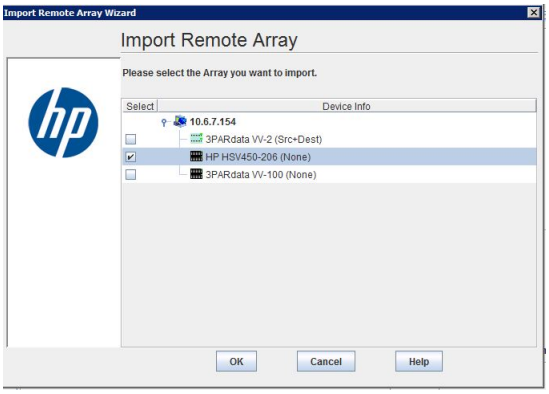
For remote migration using the Native IP method, create a remote peer connection, and then import the remote array to the local router. Importing a remote array presents the remote array's LUNs on the local router so that you can use them as destination LUNs for data migration.

To import a remote array:

1. On the **Wizards** menu, click **Import Remote Array Wizard**, and if prompted, select a blade.

   The **Import Remote Array Wizard** opens and lists the known remote arrays.
2. Under **Import Remote Array**, expand the IP address tree.
3. Select the check box next to the name of the array name to be imported, and then click OK.

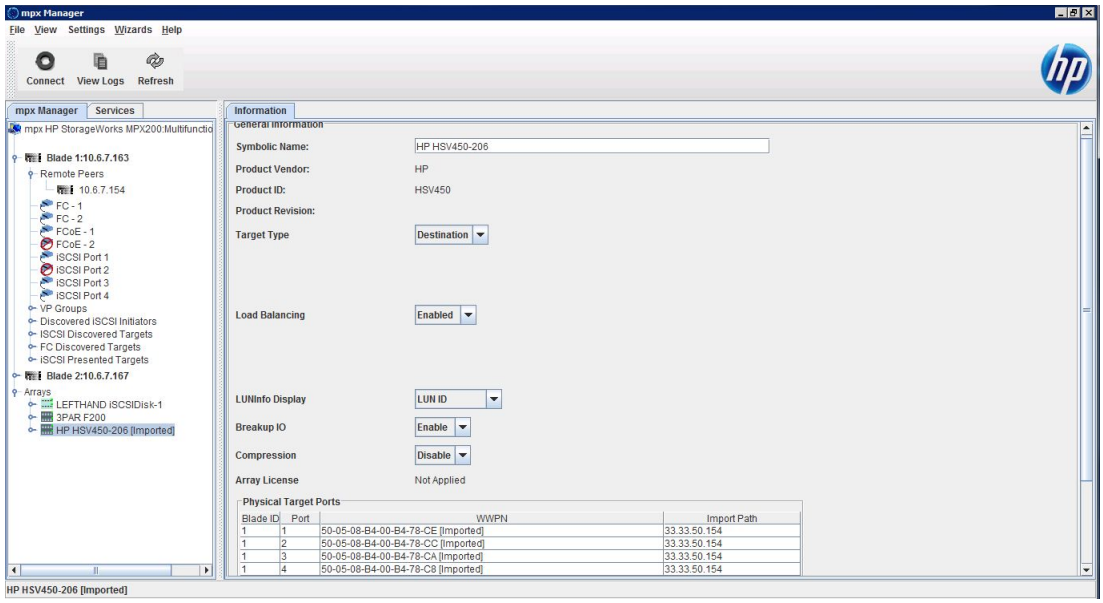
Figure 20 Add imported array



4. In the Import Remote Array Security Check dialog box, type the miguser password, and then click **OK**.

Imported arrays are identified under the Array node in the Router Tree by the text `[Imported]`.

Figure 21 View imported array



Setting array properties

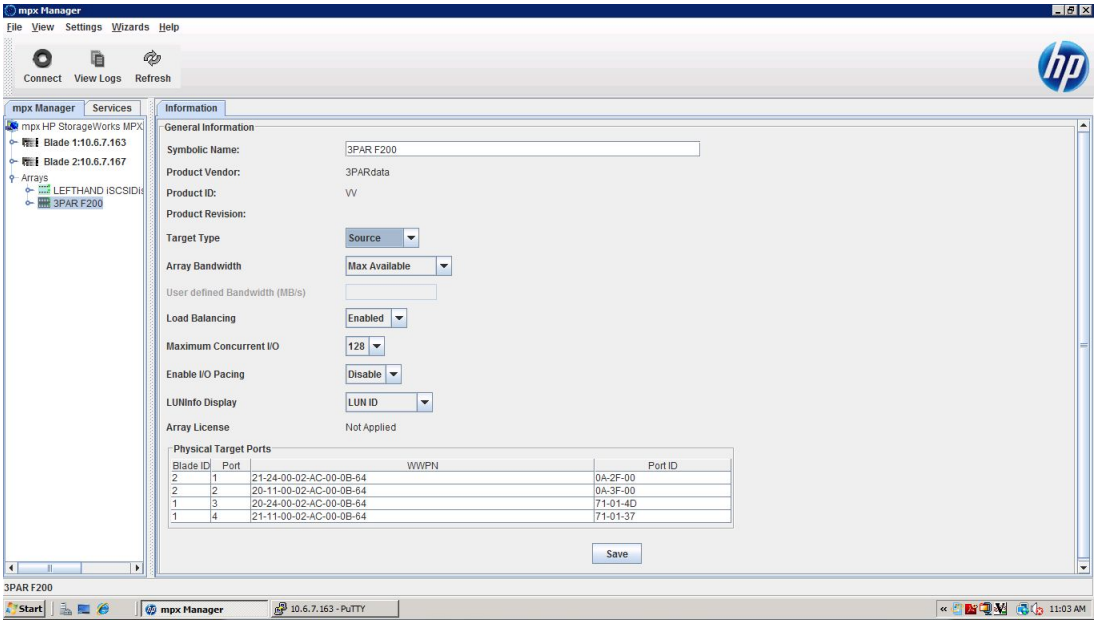
HP mpx Manager enables you to configure the target type and bandwidth, and to enable load balancing, for each storage array used in data migration.

To set array properties:

1. In the left pane, click **Arrays** to view all the FC storage arrays detected by the MPX200.
2. Click the storage array you want to use as the source array.

   The Information page in the right pane displays all the properties currently set for the selected array. Figure 22 (page 54) shows an example.

Figure 22 Information page: setting array properties



3. (Optional) In the **Symbolic Name** box, enter a user-friendly array name.
4. From the **Target Type** list, select **Source**.

NOTE: Array bandwidth is only displayed and editable if the array target type is *Source*.

5. From the **Array Bandwidth** list, click one of the following values:
   - Slow (50 MB/s)
   - Medium (200 MB/s)
   - Fast (1600 MB/s)
   - User Defined
   - Max Available
6. If you select **User Defined**, enter a value between 50 and 1600 in the **User Defined Bandwidth (MB/s)** box. By default, the MPX200 uses all available bandwidth; the minimum bandwidth required for data migration is 50 Mbps.
7. For **Load Balancing**, click either **Enabled** or **Disabled**. By default, load balancing is enabled.
8. For **Maximum Concurrent I/O**, specify the maximum quantity of data migration I/Os that can be issued concurrently to the source storage array.
9. Select **Enable I/O Pacing** to control automatic throttling and pacing of migration I/O. I/O pacing is used during data migration to limit I/O on a single array from consuming the MPX200's bandwidth, and to maximize host and migration I/O performance.
10. For **LUN Info Display**, specify whether the array's LUNs are identified by **LUN ID**, **WWULN**, or **Serial Number**.
11. To save your changes, click **Save**.
12. If the Data Migration Security Check dialog box opens, enter the administrative password. (The default password is migration.)

    HP mpx Manager displays an informative message indicating that the array properties have changed.
13. Click **OK** to close the message box.
14. To apply the changes and update the window before changing other array properties, click **Refresh**.

Creating a data migration job group

Follow these steps to create a data migration job group in HP mpx Manager.

To create a data migration job group:

1. In the left pane, click the Services tab to open the **Services** page.

   By default, the MPX200 shows Group 0 created under the Data Migration Jobs item in the left pane.
2. In the left pane, right-click **Data Migration Jobs**, and then on the shortcut menu, click Add Group. (Or on the Wizards menu, click Add Group.)
3. In the **Create New Group** dialog box, enter a group name that you want to assign to administer a set of data migration jobs, and then click **OK**.
4. In the **Data Migration Security Check** dialog box, enter the data migration user password (default is migration), and then click **OK**.

Using the data migration wizard

The data migration wizard helps simplify the configuration and scheduling of both individual and batches of data migration jobs. The following sections provide wizard details on starting and using the data migration wizard to schedule individual and batch migration jobs.

Starting the data migration wizard

Follow these steps to start the data migration wizard, and then proceed with scheduling either an individual or batch data migration job.

△ **CAUTION:** Before starting an offline data migration job, ensure that the host has no direct access to the source LUN. For online data migration, ensure that only router paths are available to the host.

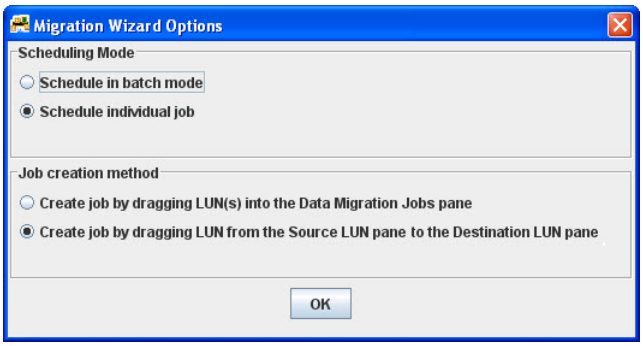
Before acknowledging a data migration job, ensure that the source and destination LUNs are not presented to any host.

To start the data migration wizard:

1. Start HP mpx Manager and connect to the MPX200 by providing the IP address of the MPX200.
2. Start the data migration wizard using one of these methods:
   - On the **Wizards** menu, click **Configure Migration Jobs**.
   - In the left pane, open the **Services** page, right-click the **Data Migration Jobs** node, and then click **Configure Migration Jobs**.
3. If the Data Migration Security Check dialog box appears, enter the data migration user password (default is *migration*), and then click **OK**.
4. If the Confirm System Time Update dialog box appears warning you of a 30 minute or more discrepancy between the host's time and the system time, do one of the following:
   - Click **Yes** to update the system time to match the host time.
   - Click **No** to keep the current system time. Note that a time discrepancy can affect job scheduling.
5. If the **Confirm LUN Filtering** dialog box appears, click **Yes** to have HP mpx Manager hide LUNs belonging to existing data migration jobs, or **No** to show all LUNs.
6. In the **Create Data Migration Job** dialog box, click **Options**.

7. Complete the Migration Wizard Options dialog box Figure 23 (page 56) as follows:
   a. Under **Schedule Mode**, click either **Schedule in batch mode** (to schedule multiple jobs) or **Schedule individual job** (to schedule a single job).
   b. Under Job Creation Method, click either **Create job** by dragging LUNs into the Data Migration Jobs pane or **Create job** by dragging LUNs from the Source LUNs pane to the Destination LUNs pane.
   c. Click **OK**.

Figure 23 Migration wizard options


Migration Wizard Options
Scheduling Mode
Schedule in batch mode
Schedule individual job
Job creation method
Create job by dragging LUN(s) into the Data Migration Jobs pane
Create job by dragging LUN from the Source LUN pane to the Destination LUN pane
OK

8. Depending on your selection in the preceding step, continue with either "Scheduling an individual data migration job" (page 56) or "Scheduling data migration jobs in batch mode" (page 58).

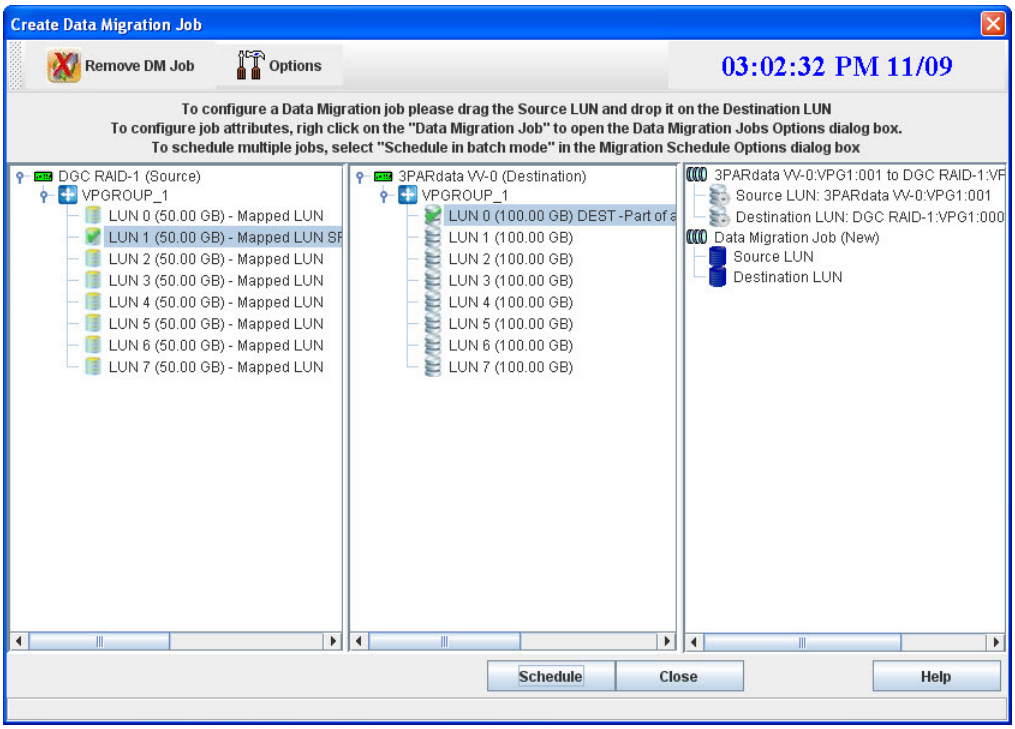
Scheduling an individual data migration job

Follow these steps to schedule an individual data migration job in HP mpx Manager.

To schedule an individual data migration job:

1. Start the data migration wizard by following the steps specified in "Starting the data migration wizard" (page 55). Ensure that in the Migration Wizard Options dialog, Figure 23 (page 56), you select **Schedule individual job**.
2. In the tri-pane **Create Data Migration Job** dialog, expand the array and VPG nodes in the left pane (source LUNs) and middle pane (destination LUNs). See the example in Figure 24 (page 57).

Figure 24 Create data migration job dialog box

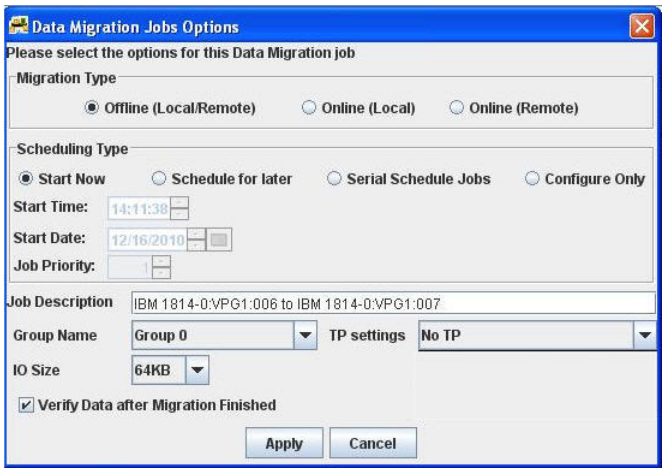

Create Data Migration Job
Remove DM Job
Options
03:02:32 PM 11/09
To configure a Data Migration job please drag the Source LUN and drop it on the Destination LUN
To configure job attributes, righ click on the "Data Migration Job" to open the Data Migration Jobs Options dialog box.
To schedule multiple jobs, select "Schedule in batch mode" in the Migration Schedule Options dialog box
DGC RAID-1 (Source)
VPGROUP_1
LUN 0 (50.00 GB) - Mapped LUN
LUN 1 (50.00 GB) - Mapped LUN
LUN 2 (50.00 GB) - Mapped LUN
LUN 3 (50.00 GB) - Mapped LUN
LUN 4 (50.00 GB) - Mapped LUN
LUN 5 (50.00 GB) - Mapped LUN
LUN 6 (50.00 GB) - Mapped LUN
LUN 7 (50.00 GB) - Mapped LUN
3PARdata VV-0 (Destination)
VPGROUP_1
LUN 0 (100.00 GB) DEST -Part of a
LUN 1 (100.00 GB)
LUN 2 (100.00 GB)
LUN 3 (100.00 GB)
LUN 4 (100.00 GB)
LUN 5 (100.00 GB)
LUN 6 (100.00 GB)
LUN 7 (100.00 GB)
3PARdata VV-0:VPG1:001 to DGC RAID-1:VF
Source LUN: 3PARdata VV-0:VPG1:001
Destination LUN: DGC RAID-1:VPG1:000
Data Migration Job (New)
Source LUN
Destination LUN
Schedule
Close
Help

3. Create the data migration job by dragging and dropping the LUNs. The method depends on the job creation method selected in Step 7
   - If the job creation method is **Create job by dragging LUNs into the Data Migration Jobs pane**, drag and drop the source LUN and the destination LUN from the left and middle panes onto the **Data Migration Job (New)** mode in the right pane.
   - If the job creation method is **Create job by dragging LUNs from the Source LUNs pane to the Destination LUNs pane**, drag and droop the source LUN from the left pane onto the destination LUN in the middle pane.

NOTE: If you attempt to drop a source LUN from the left pane onto a destination LUN of a smaller size in the middle pane, an error message notifies you of the size discrepancy. Destination arrays that are imported are indicated by `[Imported]` following the array name in the middle pane.

The **Data Migration Jobs Options** opens. See the example in Figure 25 (page 57).

Figure 25 Data migration jobs options dialog box



4. In the **Data Migration Jobs Options** dialog, specify the job attributes as follows:
   a. Under **Migration Type**, select one of the following:
      - Click **Offline (Local/Remote)** to schedule a data migration job in which the servers affected by the migration job are down.
      - Click **Online (Local)** to schedule a data migration job in which disconnecting server access to the LUN is not required. You must, however, ensure that the router is inserted correctly in the host I/O path and that no other paths from the server have access to the source LUN.
      - Click **Online (Remote)** to schedule a data migration job for which a DML exists. If a DML has not been previously configured, the online remote migration job configuration fails.

      NOTE: If the source LUN is mapped to an initiator, **Online (Local)** data migration is selected by default. Otherwise, the migration type defaults to **Offline (Local/Remote)**.

   b. Under **Scheduling Type**, select one of the following:
      - Click **Start Now** to start the job immediately.
      - Click **Schedule for Later**, and then enter a **Start Time** and **Start Date**.
      - Click **Serial Schedule Jobs**, and then assign a priority (1–256) in the **Job Priority** box, where a lower value indicates that the job is scheduled earlier than jobs configured with higher values. For more information on serial scheduled jobs, see "Starting serial scheduled jobs" (page 60).
      - Click **Configure Only** to configure the migration job without any start time or priority.

      You may start this job at a later time. To start the job, select it, and then click **Start**. Or, from the active job pane, right-click the job, and then click **Start**.
   c. In the **Job Description** box, type a user-defined name to describe this data migration job, or accept the name that HP mpx Manager provides.
   d. In the **Group Name** box, select a job group name from the list. The group name makes it easier to view the job status on a group basis.
   e. In the **TP Settings** box, select one of the following options for a thin-provisioned LUN:
      - **No TP**: The destination LUN is not thin-provisioned; the option is disabled.
      - **Yes without TP Validation**: Select this option when the destination LUN is known to be a thin-provisioned storage and is newly created.
      - **Yes with TP Validation**: Select this option if you are uncertain about the data on the destination LUN, or if the destination LUN was used previously for storing any other data. Enabling validation ensures that no corruptions exist because of stale data on the destination LUN. Enabling validation provides additional processing overhead. Typically, validation is not required for a LUN newly created for data migration.
   f. In the **IO Size** box, select one of the default I/O sizes.
   g. (Optional) For offline migration jobs only, select the **Verify Data after Migration Finished** check box to validate migrated data by reading it from the source LUN and comparing it to the destination LUN. (This option is not available for online migration jobs.)
5. To save the data migration job options, click **Apply**. Or to abandon changes to this data migration job, click **Cancel**.

Scheduling data migration jobs in batch mode

Batch mode for data migration jobs is a feature in HP mpx Manager used to schedule multiple jobs having the same priority, I/O size, and group options.

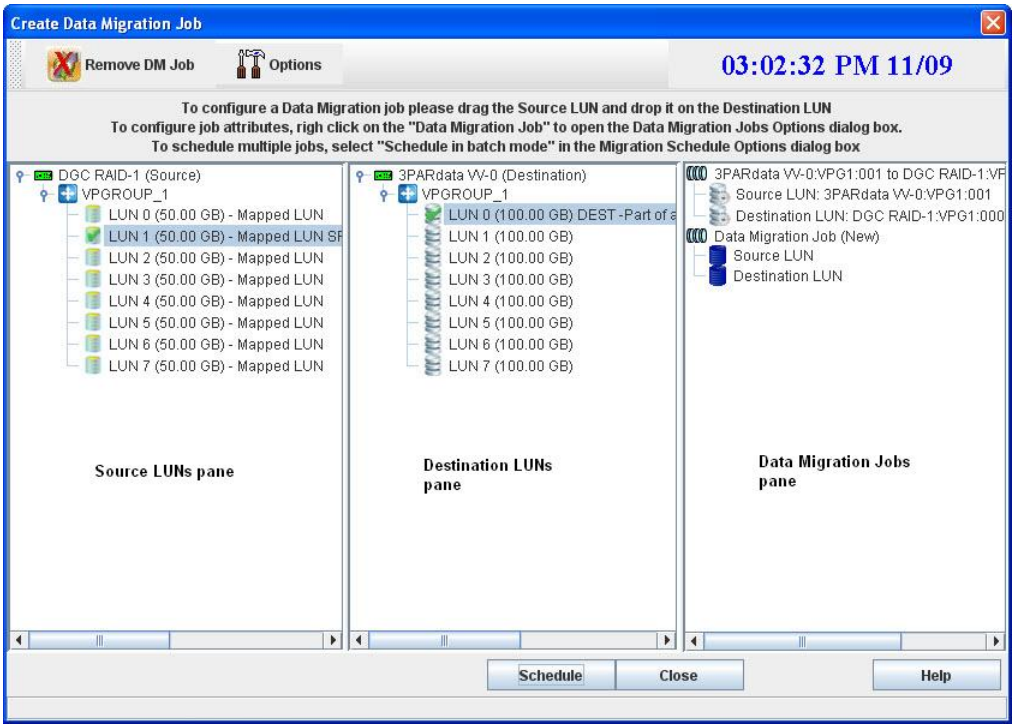
This option is particularly useful for migration jobs specified as Schedule for later and Serial Schedule Jobs on the Data Migration Jobs Options dialog box Figure 27 (page 61), where the jobs need to be classified under a specific group for better management.

To optimize MPX200 performance, HP recommends that you run simultaneously no more than four jobs on any specified source or destination array.

To schedule data migration jobs in batch mode:

1. Start the data migration wizard by following the steps specified in "Starting the data migration wizard" (page 55). Ensure that in the **Migration Wizard Options** dialog Figure 23 (page 56), you select **Schedule in batch mode**.
2. In the tri-pane **Create Data Migration Job** dialog, expand the array and VPG nodes in the left pane (source LUNs) and middle pane (destination LUNs). Figure 26 (page 59) shows an example.

Figure 26 Create data migration job dialog box


Create Data Migration Job
Remove DM Job
Options
03:02:32 PM 11/09
To configure a Data Migration job please drag the Source LUN and drop it on the Destination LUN
To configure job attributes, righ click on the "Data Migration Job" to open the Data Migration Jobs Options dialog box.
To schedule multiple jobs, select "Schedule in batch mode" in the Migration Schedule Options dialog box
DGC RAID-1 (Source)
VPGROUP_1
LUN 0 (50.00 GB) - Mapped LUN
LUN 1 (50.00 GB) - Mapped LUN
LUN 2 (50.00 GB) - Mapped LUN
LUN 3 (50.00 GB) - Mapped LUN
LUN 4 (50.00 GB) - Mapped LUN
LUN 5 (50.00 GB) - Mapped LUN
LUN 6 (50.00 GB) - Mapped LUN
LUN 7 (50.00 GB) - Mapped LUN
Source LUNs pane
3PARdata VV-0 (Destination)
VPGROUP_1
LUN 0 (100.00 GB) DEST -Part of
LUN 1 (100.00 GB)
LUN 2 (100.00 GB)
LUN 3 (100.00 GB)
LUN 4 (100.00 GB)
LUN 5 (100.00 GB)
LUN 6 (100.00 GB)
LUN 7 (100.00 GB)
Destination LUNs pane
3PARdata VV-0:VPG1:001 to DGC RAID-1:VP
Source LUN: 3PARdata VV-0:VPG1:001
Destination LUN: DGC RAID-1:VPG1:000
Data Migration Job (New)
Source LUN
Destination LUN
Data Migration Jobs pane
Schedule
Close
Help

3. Create the data migration job by dragging and dropping the LUNs. The method depends on the job creation method selected in "Starting the data migration wizard" (page 55).
   - If the job creation method is **Create job by dragging LUNs into the Data Migration Jobs pane**, drag and drop the source LUN and the destination LUN from the left and middle panes onto the **Data Migration Job (New)** node in the right pane.
   - If the job creation method is Create job by dragging LUNs from the Source LUNs pane to the Destination LUNs pane, drag and drop the source LUN from the left pane onto the destination LUN in the middle pane.

   HP mpx Manager populates the Source LUN and Destination LUN attributes and creates a new **Data Migration Job (New)** object below the first one. The default job name is created by using the source and destination array names.
4. Repeat the preceding steps to create migration jobs for all source LUNs to be migrated in a batch.
5. To save your migration job and assign job attributes, click **Schedule**. Or, to abandon your changes, click **Close**.

6. In the **Data Migration Jobs Options** dialog box Figure 25 (page 57), specify the job attributes as follows:
   a. Under **Migration Type**, select one of the following:
      - Click **Offline (Local/Remote)** to schedule a data migration job in which the servers affected by the migration job are down.
      - Click **Online (Local)** to schedule a data migration job in which disconnecting server access to the LUN is not required. You must, however, ensure that the router is inserted correctly in the host I/O path and that no other paths from the server have access to the source LUN.
      - Click **Online (Remote)** to schedule a data migration job for which a DML exists. If a DML has not been previously configured, the online remote migration job configuration fails.

      NOTE: If the source LUN is mapped to an initiator, **Online (Local)** data migration is selected by default. Otherwise, the migration type defaults to **Offline (Local/Remote)**.

   b. Under **Scheduling Type**, select one of the following:
      - Click **Start Now** to start the job immediately.
      - Click **Schedule for Later**, and then enter a **Start Time** and **Start Date**.
      - Click **Serial Schedule Jobs**, and then assign a priority (1–256) in the **Job Priority** box, where a lower value indicates that the job is scheduled earlier than jobs configured with higher values. For more information on serial scheduled jobs, see "Starting serial scheduled jobs" (page 60).
      - Click **Configure Only** to configure the migration job without any start time or priority.

      You may start this job at a later time. To start the job, select it, and then click **Start**. Or, from the active job pane, right-click the job, and then click **Start**.
   c. In the **Job Description** box, type a user-defined name to describe this data migration job, or accept the name that HP mpx Manager provides.
   d. In the **Group Name** box, select a job group name from the list. The group name makes it easier to view the job status on a group basis.
   e. In the **TP Settings** box, select one of the following options for a thin-provisioned LUN:
      - **No TP**: The destination LUN is not thin-provisioned; the option is disabled.
      - **Yes without TP Validation**: Select this option when the destination LUN is known to be a thin-provisioned storage and is newly created.
      - **Yes with TP Validation**: Select this option if you are uncertain about the data on the destination LUN, or if the destination LUN was used earlier for storing any other data. Enabling validation ensures that no corruptions exist because of stale data on the destination LUN. Enabling validation provides additional processing overhead. Typically, validation is not required for a LUN newly created for data migration.
7. To save the data migration job options, click **Apply**. Or to abandon changes to this data migration job, click **Cancel**.

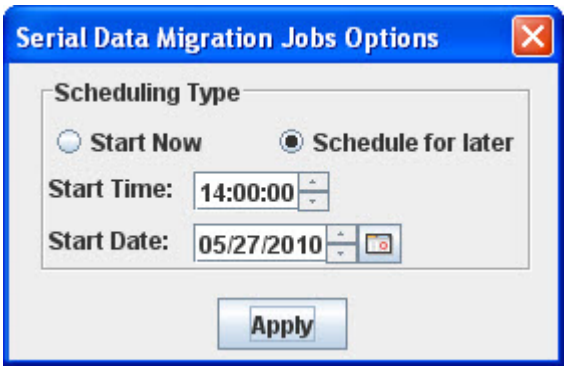
Starting serial scheduled jobs

If the individual or batch data migration job you created was configured as a Serial Schedule Jobs scheduling type on the Data Migration Jobs Options dialog box, the job is listed on the Active Data Migration Jobs page. The Status column shows the job as Serial Scheduled.

To start a serial scheduled job:

1. Open the Serial Data Migration Jobs Options dialog box, see Figure 27 (page 61) using one of these options:
   - On the Wizards menu, click **Start Serial Schedule Job(s)**.
   - Right-click a serial scheduled job, and then click **Start Serial Scheduled Jobs**. This option immediately starts the selected job, unless there are other jobs configured with a lower priority that must complete migration first.

Figure 27 Serial data migration jobs options dialog box



2. In the Serial Data Migration Jobs Options dialog box under Scheduling Type, click either **Start Now** or **Schedule for later**.
3. If you choose Schedule for later, enter the Start Time and Start Date.
4. To save your settings, click **Apply**.
5. On the Data Migration Security Check dialog box, enter your security password (the default is migration), and then click **OK**.

   The serial scheduled jobs starts when you have scheduled.

Viewing the status of data migration jobs

The right pane of the HP mpx Manager displays the job status for all active and completed data migration jobs that you have configured.

To view the status of data migration jobs:

1. In the left pane, click the **Services** tab.
2. In the left pane, expand a blade node, and then click the **Data Migration Jobs** node.
3. In the right pane, click the **Active Data Migration Jobs** tab.

   The **Active Data Migration Jobs** page shows a summarized view of all active jobs, including the following columns of information:

Group Name	**% Completed**
Job ID	**Start Time**
Job Name	**End Time**
Type	**Source Array–LUN**
Status	**Dest Array–LUN**
Job ETC (expected time of completion)	

NOTE: You can also pause, resume, stop, start, and remove active data migration jobs using the shortcut menu on the Active Data Migration Jobs page. For more information on job actions, see "Rescanning Targets" (page 45).

4. To see a summarized view of all completed jobs, click the **Completed Data Migration Jobs** tab in the right pane.
5. To view a list of all jobs, click **Data Migration Jobs** in the left pane.
6. To view a list of all jobs belonging to a specific migration group, click the migration group name in the left pane.
7. To view a list of all jobs that are currently being synchronized, click the **Synchronizing** tab in the right pane.
   Jobs are placed in a synchronized state pending acknowledgement of completed online data migration. Synchronizing occurs until all of the DRLs associated with the job are flushed to the destination array.

Viewing job details and controlling job actions

HP mpx Manager provides a view of the details of data migration jobs. From the detailed view, you can also control job actions, including pausing, stopping, deleting, resuming, and restarting the job.

To view data migration job details:

1. In the left pane, click the **Services** tab
2. In the left pane, expand a blade node, and then click the **Data Migration Jobs** node.
3. In the left pane, under the **Data Migration Jobs** node, expand a Group x node, and then select a migration job by clicking the appropriate JobID.

   Details for the specified job are listed in the Data Migration Job page in the right pane. Figure 28 (page 62) shows an example.

Figure 28 Data migration job page: job in progress

NOTE: For online data migration jobs, log details include the **Number of DRL (dirty region log) Blocks**; for offline data migration, DRL count is not applicable.

4. (Optional) On the **Data Migration Job** page, perform any of the following job control actions as needed:
   - Click **Pause** to interrupt a running migration job.
   - Click **Stop** to halt a running migration job.
   - Click **Remove** to delete a migration job.
   - Click **Resume** to continue a previously paused migration job.
   - Click **Start** to restart a previously stopped migration job.
   - Click **Change Ownership** to manually fail over the job to the peer blade.

   NOTE: The action buttons that are shown are specific to the selected migration job. For example, the Pause and Stop buttons are only shown for a job that is currently running, the Resume button is only shown for a job that is currently paused or stopped, and the Start button is only shown for a job that is currently not running.

   For completed data migration jobs, this page includes an Acknowledge button instead of the Start and Remove buttons. See "Acknowledging a data migration job" (page 67) for more information.

   For a serial scheduled job, this page also includes a **Serial Start** button. Click this button to open the **Serial Data Migration Jobs Options** dialog box, see "Starting serial scheduled jobs" (page 60).

You can also perform the preceding job control actions on the Active Data Migration Jobs page (shown when you click a group under the **Data Migration Jobs** node in the left pane). To do so, right-click a specific job, and then click the appropriate action on the shortcut menu.

Viewing system and data migration job logs

HP mpx Manager provides two types of logs: system and data migration job. This section describes how to open and view each log type.

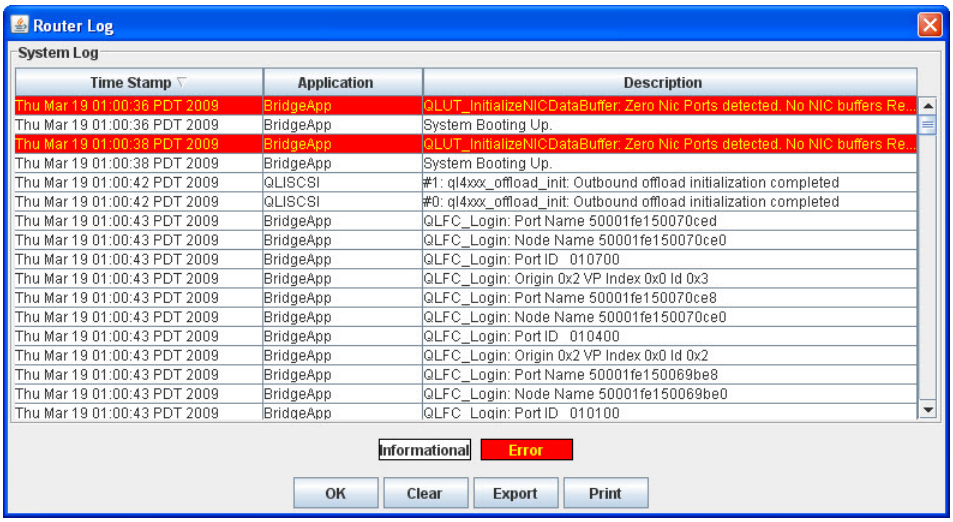
System Log

To view the system log:

1. On the HP mpx Manager main window, click the **View Logs** button.
2. In the Log Type dialog box, click System Logs.

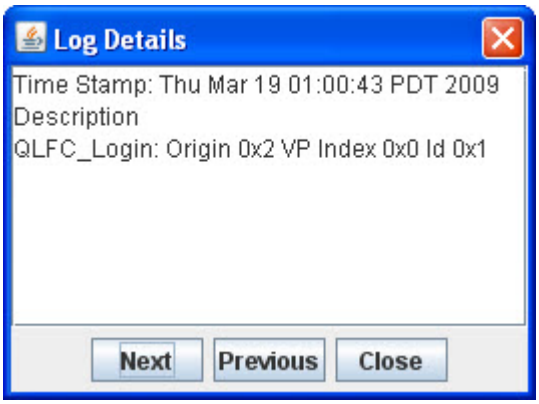
   The Router Log (System Log) dialog box opens and lists the date and time, application type, and description of each log entry. Informational entries are shown with a white background, and error entries are shown with a red background, as shown in Figure 29 (page 64).

Figure 29 Router Log (System Log) dialog box


Router Log
System Log
Time Stamp
Application
Description
Thu Mar 19 01:00:36 PDT 2009 BridgeApp QLUT_InitializeNICDataBuffer: Zero Nic Ports detected. No NIC buffers Re...
Thu Mar 19 01:00:36 PDT 2009 BridgeApp System Booting Up.
Thu Mar 19 01:00:38 PDT 2009 BridgeApp QLUT_InitializeNICDataBuffer: Zero Nic Ports detected. No NIC buffers Re...
Thu Mar 19 01:00:38 PDT 2009 BridgeApp System Booting Up.
Thu Mar 19 01:00:42 PDT 2009 QLISCSI #1: ql4xxx_offload_init: Outbound offload initialization completed
Thu Mar 19 01:00:42 PDT 2009 QLISCSI #0: ql4xxx_offload_init: Outbound offload initialization completed
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Port Name 50001fe150070ced
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Node Name 50001fe150070ce0
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Port ID 010700
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Origin 0x2 VP Index 0x0 Id 0x3
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Port Name 50001fe150070ce8
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Node Name 50001fe150070ce0
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Port ID 010400
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Origin 0x2 VP Index 0x0 Id 0x2
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Port Name 50001fe150069be8
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Node Name 50001fe150069be0
Thu Mar 19 01:00:43 PDT 2009 BridgeApp QLFC_Login: Port ID 010100
Informational
Error
OK
Clear
Export
Print

3. Use the buttons on the bottom of the Router Log (System Log) dialog box to perform the following actions:
   - Click **OK** to close the log window after you have finished viewing it.
   - Click **Clear** to delete the contents of the log.
   - Click **Export** to download the logs in CSV file format that can be viewed in any spreadsheet application, such as Microsoft Excel.
   - Click **Print** to send the contents of the log to a printer.
4. To view the time stamp and description for a single log entry, double-click the entry to open it in the Log Details dialog box, see Figure 30 (page 64). You can scroll through the log entries in this dialog box by clicking the Next and Previous buttons; to stop viewing log details, click **Close**.

Figure 30 Log details dialog box



Data migration job log

The migration log lists the details of all started, stopped, paused, removed, completed, failed, ownership changed, and acknowledged jobs. (Running jobs are not listed.)

To view the data migration job log:

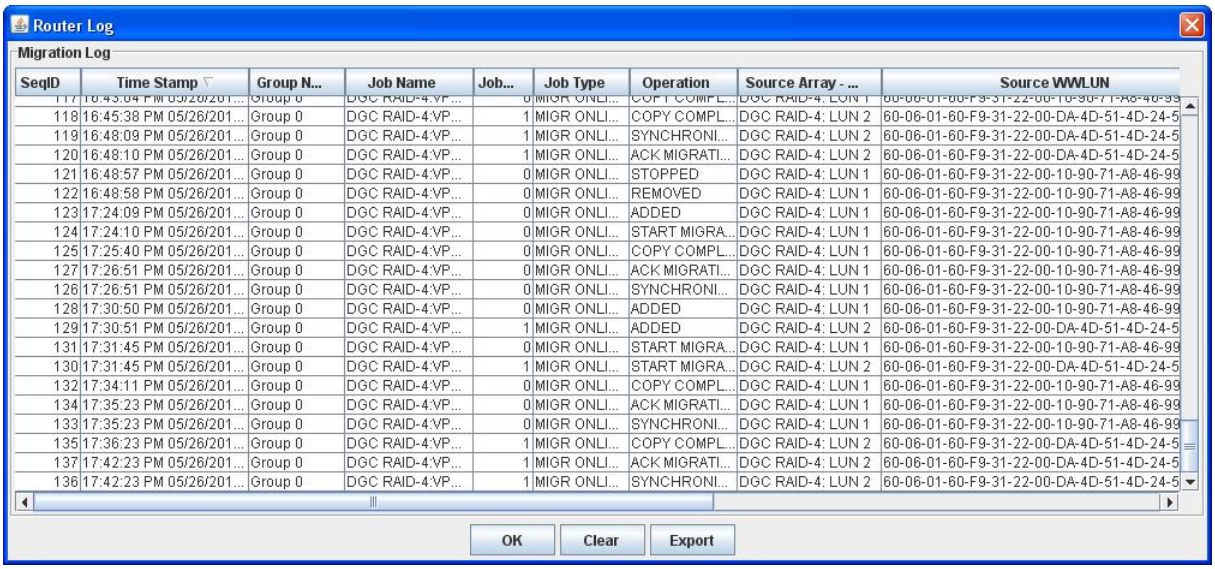
1. On the HP mpx Manager main window, click the **View Logs** button.

2. In the Log Type dialog box, click Data Migration Logs.

   The Router Log (Migration Log) dialog box opens and lists the following columns of information, as shown in Figure 31 (page 65):

SeqID is the sequential ID of log entries.
Time Stamp is the log entry time, based on router system time.
Group Name is the user-defined job group or Group 0.
Job Name is the user-defined name for the job.
Job ID is a numeric ID.
Job Type is the migration job type.
Job UUID is the universally unique identifier generated by HP mpx Manager for each job. The UUID includes the serial number of the router blade or chassis.
Priority is an attribute applicable only to serial scheduled jobs. The serial execution of jobs first starts with priority value 1, and then continues to execute jobs with the next priority value, which is 2. The maximum priority value is 256.
Operation is the task or action.
Source Array–LUN is the migration source LUN.
Source WWULN is the world wide unique LUN name for the source array.
Dest Array–LUN is the migration destination LUN.
Dest WWULN is the world wide unique LUN name for the destination array.
Migr Size is the size of the migration job (source LUN).

Figure 31 Router log (migration log) dialog box


Router Log
Migration Log
SeqID
Time Stamp
Group N...
Job Name
Job...
Job Type
Operation
Source Array - ...
Source WWLUN
118 16:45:38 PM 05/26/201... Group 0 DGC RAID-4:VP... 1 MIGR ONLI... COPY COMPL... DGC RAID-4: LUN 2 60-06-01-60-F9-31-22-00-DA-4D-51-4D-24-5
119 16:48:09 PM 05/26/201... Group 0 DGC RAID-4:VP... 1 MIGR ONLI... SYNCHRONI... DGC RAID-4: LUN 2 60-06-01-60-F9-31-22-00-DA-4D-51-4D-24-5
120 16:48:10 PM 05/26/201... Group 0 DGC RAID-4:VP... 1 MIGR ONLI... ACK MIGRATI... DGC RAID-4: LUN 2 60-06-01-60-F9-31-22-00-DA-4D-51-4D-24-5
121 16:48:57 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... STOPPED DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
122 16:48:58 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... REMOVED DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
123 17:24:09 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... ADDED DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
124 17:24:10 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... START MIGRA... DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
125 17:25:40 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... COPY COMPL... DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
127 17:26:51 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... ACK MIGRATI... DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
126 17:26:51 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... SYNCHRONI... DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
128 17:30:50 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... ADDED DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
129 17:30:51 PM 05/26/201... Group 0 DGC RAID-4:VP... 1 MIGR ONLI... ADDED DGC RAID-4: LUN 2 60-06-01-60-F9-31-22-00-DA-4D-51-4D-24-5
131 17:31:45 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... START MIGRA... DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
130 17:31:45 PM 05/26/201... Group 0 DGC RAID-4:VP... 1 MIGR ONLI... START MIGRA... DGC RAID-4: LUN 2 60-06-01-60-F9-31-22-00-DA-4D-51-4D-24-5
132 17:34:11 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... COPY COMPL... DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
134 17:35:23 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... ACK MIGRATI... DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
133 17:35:23 PM 05/26/201... Group 0 DGC RAID-4:VP... 0 MIGR ONLI... SYNCHRONI... DGC RAID-4: LUN 1 60-06-01-60-F9-31-22-00-10-90-71-A8-46-99
135 17:36:23 PM 05/26/201... Group 0 DGC RAID-4:VP... 1 MIGR ONLI... COPY COMPL... DGC RAID-4: LUN 2 60-06-01-60-F9-31-22-00-DA-4D-51-4D-24-5
137 17:42:23 PM 05/26/201... Group 0 DGC RAID-4:VP... 1 MIGR ONLI... ACK MIGRATI... DGC RAID-4: LUN 2 60-06-01-60-F9-31-22-00-DA-4D-51-4D-24-5
136 17:42:23 PM 05/26/201... Group 0 DGC RAID-4:VP... 1 MIGR ONLI... SYNCHRONI... DGC RAID-4: LUN 2 60-06-01-60-F9-31-22-00-DA-4D-51-4D-24-5
OK
Clear
Export

3. Use the buttons on the bottom of the Router Log (Migration Log) dialog box to perform the following actions:
   - Click **OK** to close the log window after you have finished viewing it.
   - Click **Clear** to delete the contents of the log.
   - Click **Export** to download the logs in CSV file format that can be viewed in any spreadsheet application, such as Microsoft Excel.

Using the Verifying Migration Jobs wizard

The data migration verification wizard helps you configure jobs to verify data transfer occurred without loss or corruption. To verify data integrity, the process executes a bit-by-bit comparison of data between the source and its corresponding destination LUN. You can configure a verification job on a pair of source and destination LUNs after a migration job has been completed and acknowledged.

The verifying migration jobs wizard is generally the same as the data migration wizard, see "Using the data migration wizard" (page 55). All scheduling options and job state changes (start, stop, pause, and so on) apply in the same way to both verification and migration jobs.

This section provides the following wizard details:

Starting the Verifying Migration Job wizard

To start the verifying migration jobs wizard:

1. Start HP mpx Manager and connect to the MPX200.
2. Start the configure verifying jobs wizard using one of these methods:
   - On the **Wizards** menu, click **Configure Verifying Jobs**.
   - In the left pane, open the Services page, right-click on either the **Blade** or **Data Migration Jobs** node, and from the shortcut menu, click **Configure Verifying Job**.
3. In the Data Migration Security Check dialog box, enter your *miguser* password (the default is `migration`), and then click **OK**.

Scheduling verification of job options

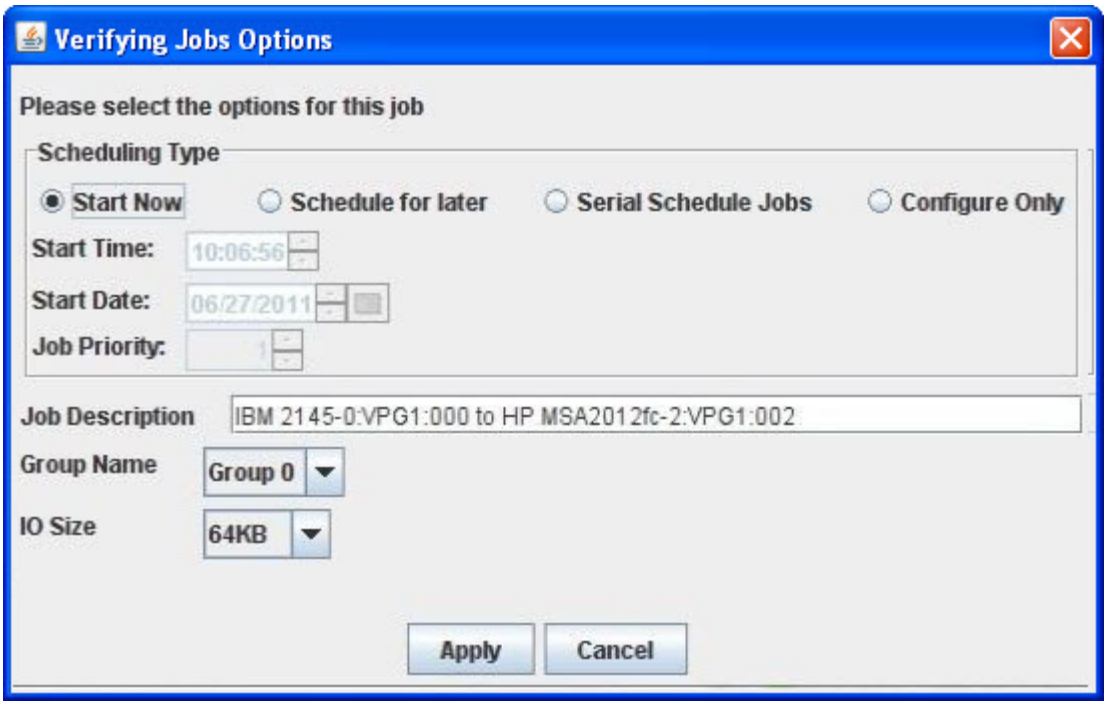
Follow these steps to schedule the verification of job options.

To schedule job option verification:

1. In the **Verify Migration Job** dialog box, click Options.
2. .In the **Verify Schedule Options** dialog box, select the **Scheduling Mode** (batch mode or individual job), and then click **OK**.
3. Add the source and destination LUN. For more information, see "Using the data migration wizard" (page 55).
4. Click **Schedule**.

   The **Verifying Jobs Options** dialog box opens. Figure 32 (page 67) shows an example.

Figure 32 Verifying jobs options dialog box



5. The contents of the **Verifying Jobs Options** dialog box are identical to the Data Migration Jobs Options dialog box. For an explanation of the selections on this dialog box, see "Using the data migration wizard" (page 55).
6. To save the verifying jobs options, click **Apply**. Or, to discard changes to this job verification, click **Cancel**.

Acknowledging a data migration job

The last action to complete a migration requires acknowledging the job. When you acknowledge a completed data migration job, HP mpx Manager does the following:

- Provides final synchronization of data between the source and destination LUN.
- Creates a job report in the migration log and job report.
- Removes the job from the system.

The sections that follow provide information on acknowledging migration jobs that are offline, online/local, and online/remote.

Acknowledging offline migration jobs

When jobs are completed, HP mpx Manager transitions offline migration jobs, verify jobs, and data scrubbing jobs to the Completed Data Migration Job page. For the router to release job resources, you must acknowledge the job. Acknowledging a completed offline migration job can be done at any time.

To acknowledge a completed offline data migration job:

1. In the left pane of HP mpx Manager, click the **Services** tab, and in the left pane under a blade node, click **Data Migration Jobs**.
2. In the right pane, click the **Completed Data Migration Jobs** tab to bring that page to the front.
3. On the Completed Data Migration Jobs page in the % Completed column, right-click a job that is specified as 100%.
4. On the shortcut menu, click **Acknowledge Completed Data Migration**.
5. On the **Confirm Acknowledgement** dialog box, click **Yes**.

Acknowledging online, local migration jobs

When initial copy jobs for online, local migration are completed, HP mpx Manager transitions the migration jobs to the Completed Data Migration Job page. While online local migration jobs are in the **Copy Complete** state the MPX200 is updating both the source and destination LUNs with any write I/O's from the host.

Completed online local migration jobs can only be acknowledged after the server is offline and the source LUN is unpresented to the server.

When you acknowledge an online, local data migration job, HP mpx Manager provides final synchronization of data between the source and destination LUN.

To acknowledge a completed online, local data migration job:

1. In the left pane of HP mpx Manager, click the **Services** tab, and in the left pane under a blade node, click **Data Migration Jobs**.
2. In the right pane, click the **Completed Data Migration Jobs** tab to bring that page to the front.
3. On the Completed Data Migration Jobs page in the % Completed column, right-click a job that is specified as 100%.
4. On the shortcut menu, click **Acknowledge Completed Data Migration**.
5. On the Confirm Acknowledgement dialog box, click **Yes**.

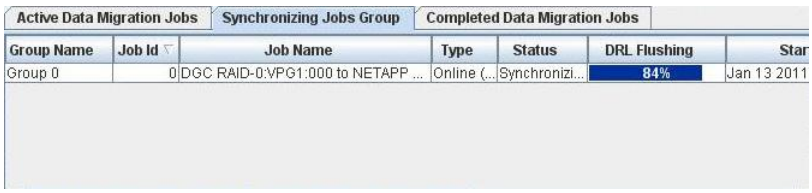
Acknowledging online, remote migration jobs

When initial copy jobs for online, remote migration are completed, HP mpx Manager transitions the migration jobs to the **Synchronizing Jobs Group** page. While online remote migration jobs are in the **Syncronizing** state the MPX200 is updating both the source and destination LUNs with any write I/O's from the host. Completed online remote migration jobs can only be acknowledged after the server is offline and the source LUN is unpresented to the server.

When you acknowledge an online, remote data migration job, HP mpx Manager provides final synchronization of data between the source and destination LUN. Because an online remote migration job acts as an asynchronous mirror operation, a large number of dirty regions (blocks) may remain unsynchronized, depending on the change rate of the data. Before planning server and application down time, it is essential that you monitor how many dirty blocks are remaining. Depending on the number of dirty blocks and the available WAN bandwidth, the time to complete final synchronization may vary.

Figure 33 (page 68) shows the Synchronizing Jobs Group page.

Figure 33 Synchronizing Jobs Group page



To acknowledge a completed online, remote data migration job:

1. In the left pane of HP mpx Manager, click the Services tab, and in the left pane under a blade node, click Data Migration Jobs.
2. In the right pane, click the **Synchronizing Jobs Group** tab to bring that page to the front.
3. On the Synchronizing Jobs Group page, right-click a job that is specified as in a Copy-Complete/Synchronizing state.
4. On the shortcut menu, click **Acknowledge Completed Data Migration**.

   The acknowledged, remote migration jobs enter the final synchronizing state and are shown as **Acknowledged / Synchronizing**.

5. On the Confirm Acknowledgement dialog box, click **Yes**.

Removing an offline array

You should remove arrays used in data migration because they are kept in persistent storage. If you used an array-based license for the data migration job and you plan to use this array again for migration, you may keep the license when removing the array.

The MPX200 allows you to remove only offline arrays. To change the array state to offline, move all array target ports to an offline state by removing target ports from the router port zone.

To remove an offline array:

1. In the left pane of HP mpx Manager, click the **Router** tab.
2. Under **Arrays**, right-click the name of the offline array you want to remove.
3. On the shortcut menu, click **Remove Offline Array**.

To remove an imported array:

1. On the local router, force down (disable) the local iSCSI ports.
2. On the local router, issue the `array rm` command to clean up the presentations from the remote router.
3. On the local router, issue the `remotepeer rm` command.
4. On the **Data Migration Security Check** dialog box, type the miguser password, and then click **OK**.

Creating and removing a DML

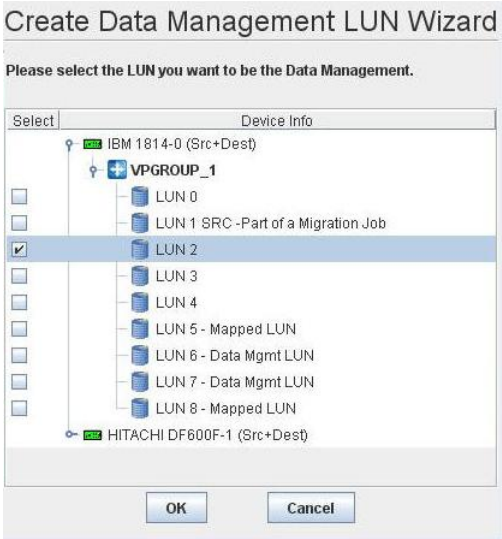
This section provides the steps to create and remove a DML in HP mpx Manager. For a description of the data management LUN, see "DML" (page 29).

To create a data management LUN in HP mpx Manager:

1. Start the Create Data Management LUN Wizard using one of these methods:
   - On the Wizards menu, click **Create Data Management LUN**, and then in the Select Blade dialog box, choose Blade 1 or Blade 2.
   - In the router tree pane, right-click a blade, and then click **Create Data Management LUN** to add a DML to the selected blade.

2. Complete the Create Data Management LUN Wizard as follows:
   a. Select a storage array for this DML.
   b. Expand a VPGROUP_n node, and then select one or more LUNs by selecting the check box to the left of each. Figure 34 (page 70) shows an example.

Figure 34 Create data management LUN wizard



   c. To save your changes and close the wizard, click **OK**.

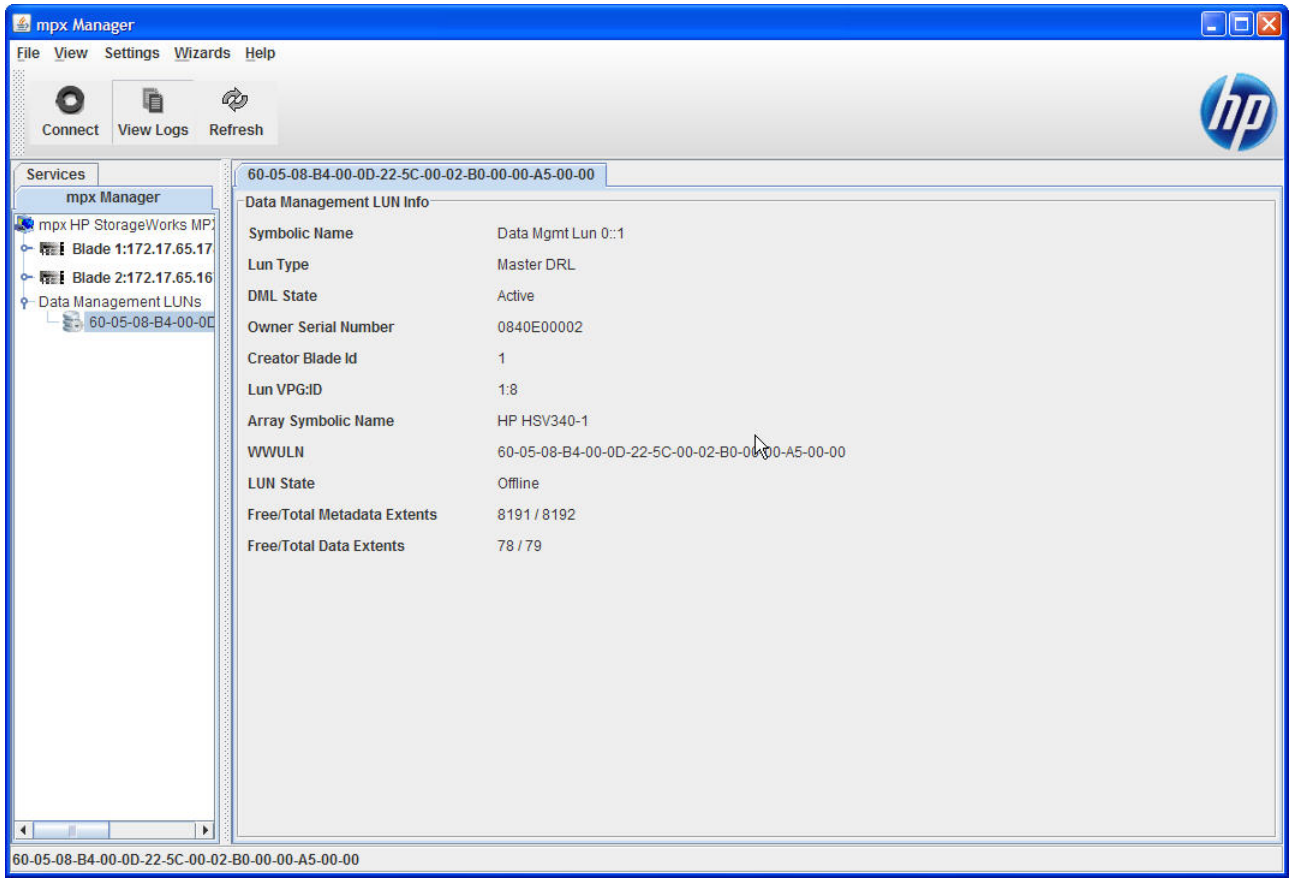
   The wizard verifies that all LUNs selected for the DML meet the following criteria:

   - The LUN is not already used as a DML.
   - The LUN is not mapped to an initiator.
   - The LUN is not currently part of a migration, compare, or scrub job.
   - The LUN is a minimum of 50 GB.
   - The LUN is online on both of the blades.

   If the LUN does not meet all of the preceding criteria, the wizard rejects the LUN, and the DML creation operation fails with the appropriate error message.

3. (Optional) To view the attributes of a DML, select a DML node under **Data Management LUNs** in the HP mpx Manager system view pane. The Data Management LUN Info page appears in the right pane; Figure 35 (page 71) shows an example.

Figure 35 Viewing data management LUN information



After using the DML for data migration, you should release (remove) it. You cannot remove the *master* DML (the first DML created) until all other DMLs are removed. That is, to remove all DMLs, you must remove the master DML last.

To remove a DML in HP mpx Manager:

1. On the **Wizards** menu, click **Remove Data Management LUN**.

   Or, in the router tree pane, right-click a blade, and then click **Remove Data Management LUN** to remove a DML from the selected blade.

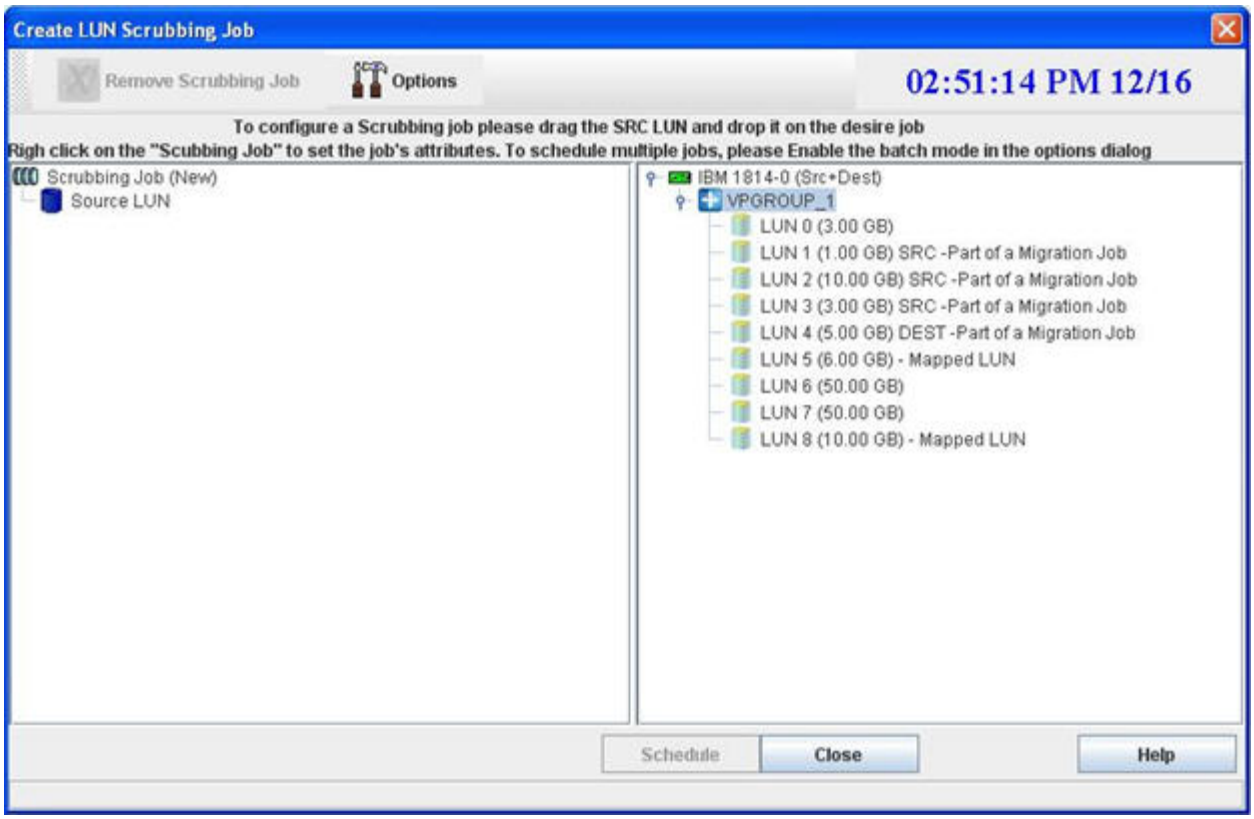
2. Complete the Remove Data Management LUN Wizard as follows:
   a. Select one or more DMLs by selecting the check box to the left of each.
   b. Click **OK** to save your changes and close the wizard.

Using the Scrubbing LUN wizard

The scrubbing LUN wizard helps you configure scrubbing jobs to destroy data residing on the LUN. This feature is primarily used to erase confidential information on the LUN. Ensure that the information will no longer be used or read by any application.

The scrubbing LUN wizard is generally the same as the Data Migration wizard, see "Using the data migration wizard" (page 55). However, you must select only source LUNs on the **Create LUN Scrubbing Job** dialog box. Figure 36 (page 72) shows an example.

Figure 36 Create LUN scrubbing job dialog box


Create LUN Scrubbing Job
Remove Scrubbing Job
Options
02:51:14 PM 12/16
To configure a Scrubbing job please drag the SRC LUN and drop it on the desire job
Righ click on the "Scubbing Job" to set the job's attributes. To schedule multiple jobs, please Enable the batch mode in the options dialog
Scrubbing Job (New)
Source LUN
IBM 1814-0 (Src+Dest)
VPGROUP_1
LUN 0 (3.00 GB)
LUN 1 (1.00 GB) SRC -Part of a Migration Job
LUN 2 (10.00 GB) SRC -Part of a Migration Job
LUN 3 (3.00 GB) SRC -Part of a Migration Job
LUN 4 (5.00 GB) DEST -Part of a Migration Job
LUN 5 (6.00 GB) - Mapped LUN
LUN 6 (50.00 GB)
LUN 7 (50.00 GB)
LUN 8 (10.00 GB) - Mapped LUN
Schedule
Close
Help

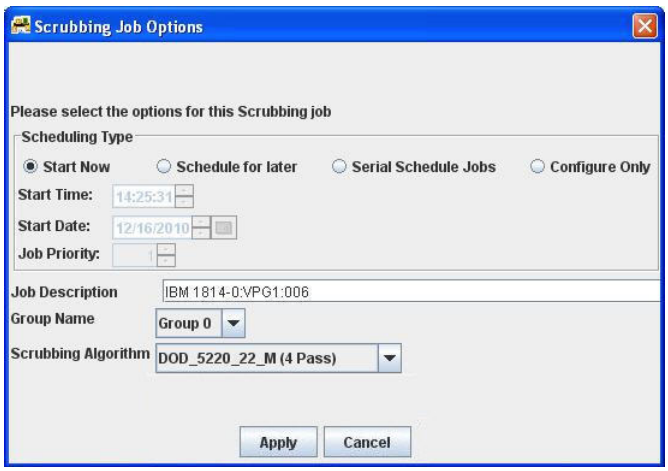
As a security measure, HP mpx Manager does not allow you to select mapped LUNs or LUNs that are part of other jobs. In addition, destination arrays are filtered out and do not appear in the right pane of the LUN selection window.

All scheduling options and job state changes (start, stop, pause, and so on) apply in the same way to both scrubbing and migration jobs. For scrubbing jobs, you can also specify one of several scrubbing algorithms. The current firmware release provides the following algorithms and passes:

- ZeroClean: Two passes
- DOD_5220_22_**M**: Four passes
- DOD_5220_22_**M**_E: Four passes
- DOD_5220_22_**M**_ECE: Eight passes

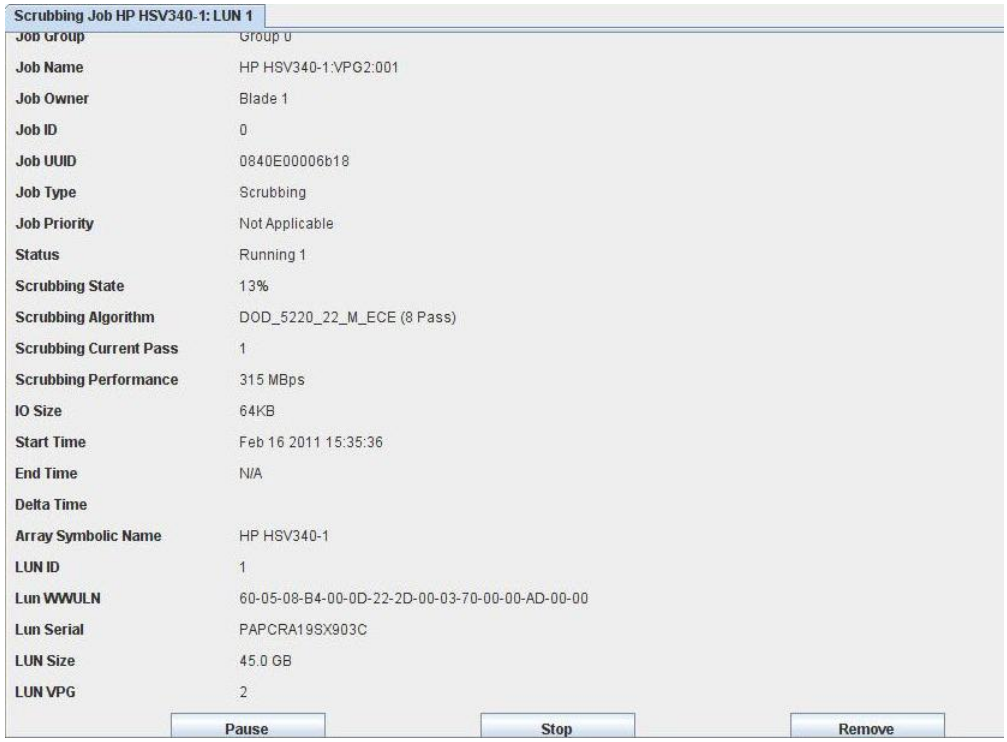
Figure 37 (page 72) shows an example of the scrubbing job options.

Figure 37 Scrubbing job options dialog box



To view the scrubbing job details, select the appropriate job in the appropriate group, as shown in Figure 38 (page 73).

Figure 38 Scrubbing job page



Generating a data migration report

HP mpx Manager provides reporting of data migration jobs that have either been acknowledged or removed from the system. Each migration job entry in the report lists the job details, including source and destination LUN information. You can generate migration reports in three formats: TXT, JSON, and XML. The TXT format is human readable; the JSON and XML formats are suitable for automation by scripts developed to parse the reports and present the data on a Web site or other external application.

The following shows sample output from a migration report. Note that the Operation entries specifying REMOVED and ACKNOWLEDGED jobs may be intermixed because the entries are posted in chronological order, rather than categorized based on the job operation.

```
Migration Report Entry
----------------------
Time = Wed Jan 12 11:12:31 2011
Job Id = 6
Job UUID = 0834E00029b1120
Job Name = DGC RAID-1:VPG1:006 to NETAPP LUN-0:VPG1:006
Group Id = 0
Group Name = Group 0
Job Type = Migration
Migration Type = Online (Remote)
Priority = 0
IOsize = 64
Operation = ACKNOWLEDGED
Blade Serial No = 0906E00039
Chassi Serial No = 0834E00029
Start Time = Wed Jan 12 10:37:28 2011
End Time = Wed Jan 12 10:39:54 2011
Acknowledge Time = Wed Jan 12 11:12:31 2011
Performance = 14364
Migration Size = 2097151
```

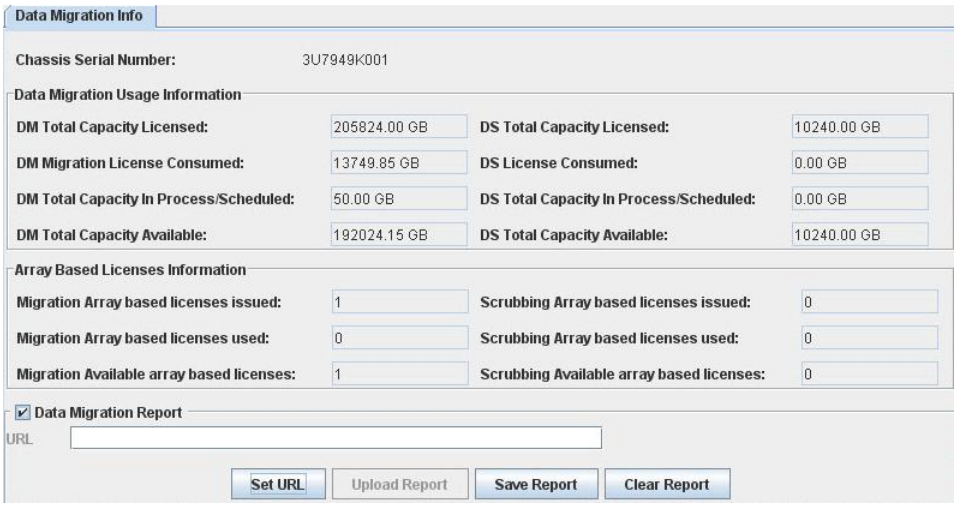
```
Src Lun Info
------------
Src Symbolic Name = DGC RAID-1
Src Lun Id = 6
Src Vp Index = 1
Src Lun Start Lba = 0
Src Lun End Lba = 2097151
Src Lun Size = 2097151
Src Lun Vendor Id = DGC
Src Lun Product Id= RAID 10
Src Lun Revision = 0223
Src Lun Serial No = SL7E1083500091
NAA WWULN = 60:06:01:60:f9:31:22:00:62:98:eb:c9:6e:1a:e0:11
Vendor WWULN = 00:02:00:00:00:00:00:00:02:00:00:00:00:00:00
Dst Lun Info
------------
Dst Symbolic Name = NETAPP LUN-0
Dst Lun Id = 6
Dst Vp Index = 1
Dst Lun Start Lba = 0
Dst Lun End Lba = 2104514
Dst Lun Size = 2104514
Dst Lun Vendor Id = NETAPP
Dst Lun Product Id= LUN
Dst Lun Revision = 0.2
Dst Lun Serial No = C4i/aJaJ1eI8
NAA WWULN = 60:a9:80:00:43:34:69:2f:61:4a:61:4a:31:65:2d:56
EUI WWULN = 4a:61:4a:31:65:38:4b:00:0a:98:00:43:34:69:2f:61
T10 WWULN = NETAPP LUN C4i/aJaJ1eI8
```

To save data migration job information for the blade to a report:

1. In the left pane, click the **Services** tab.
2. Select the blade on which the report is to be generated.

   The Data Migration Info page for the selected blade appears in the right pane, as shown in Figure 39 (page 74).

Figure 39 Data migration info for a blade



3. Select the **Data Migration Report** check box.
4. Determine whether you want to upload the report to a server or save the report to a local router.

5. To upload the report (currently in JSON format only) to a server, follow these steps:
   a. In the URL box, enter the address where you want the report to be uploaded. Ensure that this URL runs an HTTP service that can accept uploaded files and also acknowledge their receipt.
   b. Click **Set URL** to save the URL.
   c. Click **Upload Report** to transfer the report to the specified location.
6. Or, to save the report to a local router, follow these steps:
   a. Click **Save Report** to save the file with the default report file name, `Migration_Report.tar.gz`, to the local router's default FTP folder.
   b. On the **Save Migration Report** dialog box, enter the `miguser` password, and then click **OK**. If the report is saved successfully, the Saved Report message box indicates that you can retrieve (using FTP) from the MPX200 blade, the report file `Migration_Report.tar.gz`.
   c. Use FTP to access the router using the user name ftp and password ftp:
      1. At the workstation prompt, issue the `ftp` command to go to the location on the router. For example:
```
C:\fwImage>ftp 172.17.137.190

Connected to 172.17.137.190.

220 (none) FTP server (GNU inetutils 1.4.2) ready.
```
      2. Enter your user name and password. For example:
```
User (172.17.137.190:(none)): username ftp

331 Guest login ok, enter your name as password.

Password: ftp

230 Guest login ok, access restrictions apply.
```
      3. Locate and extract the `Migration_Report.tar.gz` file.
7. To clear the internal data migration job report, click **Clear Report**. Clearing the report is typically done to remove existing data migration information before beginning additional data migration jobs. After new jobs are complete, you can generate a new report to view the new migration entries. If you do not first clear the previous report data, the new REMOVED and ACKNOWLEDGED job entries are appended to the existing report when you click Save Report.

NOTE: To generate a migration report in the CLI, see "migration_report" (page 100).

6 Command line interface

This chapter provides information on using the CLI for data migration solutions. It defines the guest MPX200 account and the user session types, admin and miguser. For each command, it provides a description, the required session type, and an example. To view information about all CLI commands, see the *MPX200 Command Line Interface (CLI) User Guide*.

User accounts

User accounts include the guest account. The guest account is the default user account used to log into the MPX200 Telnet session. The guest session has a view-only type of access. The default password for this account is password.

User sessions

User sessions include the *admin* session and *miguser* session, as described in the following sections.

Admin session

The *admin* is the system administrator session that provides access to CLI commands that manage the system resources. The default password for starting the admin session is *config*. You can start and stop an admin session using the following commands:

```
admin [start/begin]

admin [end/cancel/stop]


MPX200 <1> #> admin start

Password : *********

MPX200 <1> (admin) #>

MPX200 <1> (admin) #> admin cancel

MPX200 <1> #>
```

Miguser session

The *miguser* is the migration administrator session that has privileges to run CLI commands related to the migration operations. The default password for starting the miguser session is *migration*. You can start and stop a miguser session using the following commands:

```
miguser [start/begin]

miguser [end/cancel/stop]


MPX200 <1> #> miguser begin

Password : *********

MPX200 <1> (miguser) #>

MPX200 <1> (miguser) #> miguser stop

MPX200 <1>#>
```

NOTE: Because data migration and admin CLI commands for the MPX200 are executed at the blade level (not chassis), you must first select a blade by issuing the blade `n` command.

Command syntax

The MPX200 CLI command syntax uses the following format:

```
command
   keyword
   keyword [value]
   keyword [value1] [value2]
```

The command is followed by one or more options. Consider the following rules and conventions:

- Commands and options are case insensitive.
- Required option values appear in standard font within brackets; for example, `[value]`.
- Non-required option values appear in italics within brackets; for example, *`[value]`*.

In command prompts, `<1>` or `<2>` indicates which blade is being managed.

Command line completion

The command line completion feature simplifies entering and repeating commands. Table 10 (page 77) lists the command line completion keystrokes.

Table 10 Command line completion keystrokes

Keystroke	Effect
TAB	Completes the command line. Type at least one character, and then press the **TAB** key to complete the command line. If more than one possibility exists, press the **TAB** key again to view all possibilities.
UP ARROW	Scrolls backward through the list of previously entered commands.
DOWN ARROW	Scrolls forward through the list of previously entered commands
CTRL+A	Moves the cursor to the beginning of the command line.
CTRL+E	Moves the cursor to the end of the command line.

Authority requirements

The various set commands perform tasks that may require you to be in an administrator session. Note that:

- Commands related to monitoring tasks are available to all account names.
- Commands related to configuration tasks are available only within an Admin session. An account must have Admin authority to enter the `admin start` command, which opens an admin session, see "Admin session" (page 76).

Commands

This section provides the DMS CLI commands arranged alphabetically by command name.

array

Imports or removes an array:

- Imports a remote array to local router as a destination. After importing an array to local router it becomes available for migration.
- Removes from persistence the details associated with an offline array, and may remove the license information associated with the array.

Authority

miguser

Syntax

```
array
   import
   rm
```

Keywords

`import`	Imports a remote array to local router as a destination
`rm`	Removes from persistence the details associated with an offline array, and may remove the license information associated with the array.

Examples

The following example shows the `import` command:

```
MPX200 <1> (admin) #> array import

Index (Symbolic Name/Serial Number)
----- -----------------------------
0      Blade-1(2800111111)
Please select a remote system from the list above ('q' to quit): 0
Remote System Information
-------------------------
Product Name          MPX200
Symbolic Name          Blade-1
Serial Number          2800111111
No. of iSCSI Ports        2
iSCSI Base Name         iqn.1992-08.com.qlogic:isr.2800111109.b1
Mgmt IPv4 Address        172.35.14.71
Mgmt IPv6 Link-Local       ::
Mgmt IPv6 Address 1        ::
Mgmt IPv6 Address 2        ::
No. of iSCSI Remote Connections  1
Remote iSCSI Connection Address  1 70.70.70.71 through 70.70.70.77
Do you wish to Import Array from the REMOTE system above? (y/n): y
Fetching Array information from Remote Peer.....
Index  VendorId  ProductId  Symbolic Name  WWPN,  PortId/
iScsiName,  Ip Address
----- -------- --------- -------------
-----------------------------------
0     IBM   2145   IBM 2145-0
50:05:07:68:02:30:13:47, 01-03-00
Please select a remote Array index from the list above: 0
ArrayImport: Import Array Successful
```

The following example shows the `array rm` command:

```
MPX200 <2> (miguser) #> array rm
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index    WWPN, PortId/ iScsiName, Ip Add    Symbolic Name        Target Type
-----    -------------------------------  -------------------- ------------
0        50:06:01:60:4b:a0:35:f6, 61-05-00  DGC RAID-0           Source
Please select a Target Id to remove from the list above ('q' to quit): 0
WARNING: This array is currently licensed.
Removing the array license will not allow you to reuse
```

```
this license in future for any array (including this array).
Do you want to remove the array license (Yes/No)? [No]
WARNING: Removing physical targets associated with this array will remove
all LUN presentations (if any) to hosts from these targets.
Do you want to remove the physical targets for this array (Yes/No)? [Yes]
All attribute values for that have been changed will now be saved.
```

array_licensed_port

Use with keyword `rm` to remove licensed offline array ports.

Authority

miguser

Syntax

`array_licensed_port` [*keyword*]

Keywords

The following example shows the `array_licensed_port rm` command:

`rm` Removes licensed offline array ports. Use this command to remove the ports (shown by the `show migration_usage` command) for which you have removed an array without also removing the array's license.

```
array_licensed_port rm
```

Examples

The following example shows the `array_licensed_port rm` command:

```
MPX200 <1> (miguser) #> array_licensed_port rm
01. Symbolic name = DGC RAID-1

No of ports registered = 2
   WWNN, WWPN 50:06:01:60:cb:a0:35:de, 50:06:01:60:4b:a0:35:de
   WWNN, WWPN 50:06:01:60:cb:a0:35:de, 50:06:01:68:4b:a0:35:de
02. Symbolic name = DGC RAID-1

No of ports registered = 2
   WWNN, WWPN 50:06:01:60:cb:a0:35:de, 50:06:01:60:4b:a0:35:de
   WWNN, WWPN 50:06:01:60:cb:a0:35:de, 50:06:01:68:4b:a0:35:de
Please select a Id to remove from the list above ('q' to quit): 01
All attribute values that have been changed will now be saved.
```

compare_luns

Manages data migration LUN comparison jobs, including scheduling, starting, stopping, pausing, resuming, and deleting jobs, as well as acknowledging completed jobs.

Authority

miguser

Syntax

`compare_luns` [*keyword*]

Keywords

`acknowledge`	Acknowledges a successfully completed LUN compare job. After you run this command, the LUN compare job is permanently deleted from the database.
`add`	Schedules a standalone LUN compare job. You can name the job and associate it with a job group. Scheduling options include: immediately, at a pre-defined later time, or by serial scheduling. Serial scheduling requires that you assign a priority to the job, which will be used to schedule it prior to (lower priority value) or after (higher priority value) a specific job in the serial schedule job queue.
`pause`	Interrupts a running LUN compare job. This command freezes the compare process. You can later resume the job from the block where the compare was paused.
`resume`	Resumes a paused LUN compare job. The job resumes from the block where the compare was paused.
`rm`	Deletes a LUN compare job.
`rm_peer`	Removes the compare job from a peer blade when the owner blade is not up.
`start`	Restarts a stopped LUN compare job. The compare process restarts from the first block.
`stop`	Stops running a LUN compare job. Use this command if you need to stop the compare process due to some technical or business need. Use this command also on already-configured scheduled jobs to change the scheduling time.

Examples

The following example shows the `compare_luns acknowledge` command:

```
MPX200 <1> (miguser) #> compare_luns acknowledge
Job      Type         Status                   Job Description
ID
 ----    ----    ------------------------ ------------------------------------
0        Offline    Completed               HP HSV200-0:0001 to DGC RAID-1:0000

Please select a Job Id from the list above ('q' to quit): 0

All attribute values for that have been changed will now be saved.
```

The following example shows the `compare_luns add` command:

```
MPX200 <2> (miguser) #> compare_luns add
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index  WWPN, PortId                     Symbolic Name          Target Type
-----  -------------------------------- --------------------  ------------
0      20:78:00:c0:ff:d5:9a:05, 8c-01-ef  HP MSA2012fc-0         Src+Dest
1      50:00:1f:e1:50:0a:37:18, 82-01-00  HP HSV210-3            Src+Dest

Please select a Source Target from the list above ('q' to quit): 1
Index (VpGroup Name)
----- --------------
1     VPGROUP_1
2     VPGROUP_2
3     VPGROUP_3
4     VPGROUP_4
Please select a VPGroup for Source Lun ('q' to quit): 1

LUN Vendor  LUN Size( GB)  Attributes
--- ------  -------------- ----------
1   HP    10.00          SRC LUN
2   HP    10.00
3   HP    20.00
4   HP    20.00
5   HP    10.00
6   HP    5.00
7   HP    5.00
Please select a LUN as a Source Lun ('q' to quit): 1
Index WWPN, PortId                        Symbolic Name        Target Type
----- ----------------------------------  -------------------- ------------
0     20:78:00:c0:ff:d5:9a:05, 8c-01-ef    HP MSA2012fc-0       Src+Dest
1     50:00:1f:e1:50:0a:37:18, 82-01-00    HP HSV210-3          Src+Dest
Please select a Destination Target from the list above ('q' to quit): 1
Index (VpGroup Name)
----- --------------
1     VPGROUP_1
2     VPGROUP_2
3     VPGROUP_3
4     VPGROUP_4
```

```
Please select a VPGroup for Destination Lun ('q' to quit): 1
LUN Vendor LUN Size( GB)  Attributes
--- ------ -------------- ----------
1     HP   10.00          SRC LUN
2     HP   10.00
3     HP   20.00
4     HP   20.00
5     HP   10.00
6     HP   5.00
7     HP   5.00
Please select a LUN as a Destination Lun('q' to quit): 2
I/O Size (0=32KB, 1=64KB, 2=128KB, 3=512KB, 4=1MB) [64KB ]

Please Enter a Job Description (Max = 64 characters)
default name [ HP HSV210-3:VPG1:001 to HP HSV210-3:VPG1:002 ]
Index Group Owner Group Name
----- ----------- ----------
0       2         Group 0
Please select a Group that this Job should belong to [0]
Start Time (1=Now, 2=Delayed, 3=JobSerialScheduling, 4=ConfigureOnly) [Now ]
Successfully created Job
All attribute values for that have been changed will now be saved.
```

The following example shows the `compare_luns pause` command:

```
MPX200 <1> (miguser) #> compare_luns pause
Job Type          Status                   Job Description
ID
--- ----          ------------------------  ------------------------------------
0   Offline       Verify Running           HP HSV200-0:0001 to DGC RAID-1:0000
Please select a Job Id from the list above ('q' to quit): 0
All attribute values for that have been changed will now be saved.
```

The following example shows the `compare_luns resume` command:

```
MPX200 <1> (miguser) #> compare_luns resume
Job Type       Status                    Job Description
ID
--- ----       ------------------------  ------------------------------------
0   Offline    Verify Paused             HP HSV200-0:0001 to DGC RAID-1:0000
Please select a Job Id from the list above ('q' to quit): 0
All attribute values for that have been changed will now be saved.
```

The following example shows the `compare_luns rm` command:

```
MPX200 <1> (miguser) #> compare_luns rm
Job Type     Status                     Job Description
ID
--- ----     ------------------------   ------------------------------------
0   Offline  Verify Running             HP HSV200-0:0001 to DGC RAID-1:0000
Please select a Job Id from the list above ('q' to quit): 0
Do you wish to continue with the operation(yes/no)? [No] yes
All attribute values for that have been changed will now be saved.
```

The following example shows the `compare_luns rm_peer` command:

```
MPX200 <1> (miguser) #> compare_luns rm_peer

Job Type     Status                    Job Description
ID
--- ----     ------------------------  ------------------------------------
0   Offline  Verify Running            HP HSV200-0:0001 to DGC RAID-1:0000
Please select a Job Id from the list above ('q' to quit): 0
Do you wish to continue with the operation(yes/no)? [No] yes
All attribute values for that have been changed will now be saved.
```

The following example shows the `compare_luns start` command:

```
MPX200 <1> (miguser) #> compare_luns start

Job Type     Status                    Job Description
ID
--- ----     ------------------------  ------------------------------------
0   Offline  Stopped            HP HSV200-0:0001 to DGC RAID-1:0000
Please select a Job Id from the list above ('q' to quit): 0
Start Time for JobId 0:(1=Now, 2=Delayed, 3=JobSerialScheduling) [Now ] 2
Please specify a Date & Time (in <MMddhhmmCCYY> format)  when the should start.
This should be  within the next 30 days.  [           ] 121610002011
```

```
All attribute values for that have been changed will now be saved.
```

The following example shows the `compare_luns stop` command:

```
MPX200 <1> (miguser) #> compare_luns stop

Job Type     Status                    Job Description
ID
--- ----     ------------------------  ------------------------------------
0   Offline  Verify Running            HP HSV200-0:0001 to DGC RAID-1:0000
Please select a Job Id from the list above ('q' to quit): 0
All attribute values for that have been changed will now be saved.
```

dml

Adds and deletes DMLs. To see a list of all configured DMLs and their DML-specific attributes, see "show dml" (page 115).

Authority

miguser

Syntax

`dml`

Keywords

`create`	Lists attributes for LUNs that are part of other jobs or already used as DMLs. Issue this command to avoid inadvertently using these LUNs for creating a DML. The MPX200 rejects such LUNs (if selected) and fails the DML create operation. The first DML is treated as the *master* DML and cannot be deleted until other DMLs are deleted. LUNs used as DMLs must have a minimum size of 50GB for the `dml create` command to succeed; however, the recommended minimum size is 100GB.
`delete`	Lists all configured DMLs. The first DML is considered to be the *master* DML and cannot be deleted until all other DMLs are deleted.

Examples

The following example shows the `dml create` command:

```
MPX200 <1> (miguser) #> dml create
Data Management Lun type (1 = Remote Migration) [ 1 ]
Index WWPN, PortId/ iScsiName,  Ip Add   Symbolic Name    Target Type
-----  --------------------------------   ----------------- -----------
0     50:06:01:62:41:e0:49:2e,  82-01-00    DGC RAID-2         Src+Dest
1     50:00:1f:e1:50:0a:e1:48,  82-0c-00    HP HSV200-0        Src+Dest
2     50:00:1f:e1:50:0a:37:18,  82-04-00    HP HSV210-3        Src+Dest
3     50:0a:09:81:88:cd:63:f5,  61-0b-00    NETAPP LUN-3       Src+Dest
4     iqn.2001-05.com.,         20.20.20.2  EQLOGIC 100E-00-4  Src+Dest
5     iqn.2001-05.com.,         20.20.20.2  EQLOGIC 100E-00-5  Src+Dest
6     iqn.2001-05.com.,         20.20.20.2  EQLOGIC 100E-00-6  Src+Dest
7     iqn.2001-05.com.,         20.20.20.2  EQLOGIC 100E-00-7  Src+Dest
Please select a Target from the list above ('q' to quit): 1
Index (VpGroup Name)
----- --------------
1     VPGROUP_1
2     VPGROUP_2
3     VPGROUP_3
4     VPGROUP_4
Please select a VPGroup from the list above ('q' to quit): 1
LUN  Vendor  LUN Size( GB)  Attributes Serial Number/WWULN
---  ------  -------------- ---------- --------------------
5      HP      100.000        PB5A8C3AATK8BW
                              60:05:08:b4:00:10:6b:ac:00:02:a0:00:00:af:00:00

Please select a LUN from the list above ('q' to quit): 5
Successfully initiated data management lun creation
```

The following example shows the `dml delete` command:

```
MPX200 <1> (miguser) #> dml delete
Index SymbolicName
----- ------------
0     Data Mgmt Lun 0::1
1     Data Mgmt Lun 0::2
Please select a Data Mgmt Lun from the List above ('q' to quit): 1
  Successfully initiated Data Management Lun deletion
```

get_target_diagnostics

Obtains data (such as READ CAPACITY or INQUIRY) either from a single target port (if an array is not formed) or from all target ports of an array and makes the data available for debugging purposes. The data is either stored in a file or displayed on the CLI in a raw format. Manually review the data with the SCSI specification documents.

The `get_target_diagnostics` command provides the following options:

- **Execute a custom command.** This option lets you execute commands not included in the default set and also other vendor-specific commands. Note that the custom command must only be a READ type command.
- **Execute the default set of commands.** The default command set includes the following commands:
  - REPORT LUNs
  - INQUIRY:
    - Standard INQUIRY
    - Supported VPD pages
    - Unit serial number
    - Device identification
    - Block limits VPD page
    - Thin-provisioning VPD page
  - REPORT SUPPORTED OPERATIONS CODES
  - READ CAPACITY:
    - CDB 10
    - CDB 16
  - GET LBA STATUS
  - REPORT TARGET PORT GROUPS
  - TEST UNIT READY
  - READ [1 block]
- **Execute one specific command from the default set.** This option allows you to select one of the commands from the default set.

Authority

admin

Syntax

```
get_target_diagnostics
```

Examples

The following example shows the `get_target_diagnostics` command by executing one specific command from the default set.

```
MPX200 <1> (admin) #> get_target_diagnostics
Index State  (Symbolic Name, WWPN/WWNN,WWPN/iSCSI Name, Ip Address)
----- -----  ------------------------------------------------------
0     Online   DGC RAID-1, 50:06:01:68:4b:a0:35:f6
1     Online   HP MSA2324fc-6, 24:70:00:c0:ff:da:2c:56
Please select a Array/Target from the list above ('q' to quit): 1
Index (VpGroup Name)
----- --------------
1      VPGROUP_1
2      VPGROUP_2
Please select a VpGroup from the list above ('q' to quit): 1
Do you want to execute command on 1)All LUNs 2)Single LUN: ('q' to quit): 2
Index (LUN/VpGroup)
-----  -------------
0      0/VPGROUP_1
1      1/VPGROUP_1
2      2/VPGROUP_1
Please select a LUN from above ('q' to quit): 1
Removes the mapping of a LUN from an initiator.Index (Operation)
-----  ------------
1      Execute custom command
2      Execute default command set
3      Execute one command from default command set
Please select an Operation from above ('q' to quit): 3
Index (Command)
-----  ---------
1      REPORT LUNS
2      STANDARD INQUIRY
3      SUPPORTED VPD PAGE
4      UNIT SERIAL NUMBER VPD PAGE
5      DEVICE IDENTIFICATION VPD PAGE
6      BLOCK LIMITS VPD PAGE
7      THIN PROVISIONING VPD PAGE
8      READ CAPACITY 10
9      READ CAPACITY 16
10     GET LBA STATUS
11     REPORT TARGET PORT GROUP
12     TEST UNIT READY
13     READ
14     REPORT SUPPORTED OP CODES
Please select a command from above ('q' to quit): 3
Do you want to save output in file? [1) Yes 2) No]: 2
Do you want to display output on CLI? [1) Yes 2) No]: 1
USER INPUTS
================================================
TARGET WWPN :- 00:00:07:00:01:00:00:00
================================================
================================================
PATH 0 :- 24:70:00:c0:ff:da:2c:56
================================================
COMMAND :- SUPPORTED VPD PAGES (0x12 / 0x00)
LUN ID :- 0001000000000000
STATUS :- 0
SCSI STATUS :- 0
CDB :- 12010000ff00000000000000000000000
DATA TRANSFER LENGTH :- 32768
RESIDUE TRANSFER LENGTH :- 32759
ACTUAL DATA LENGTH :- 9
DATA :-
00 00 00 05 00 80 83 85 d0
END OF COMMAND
================================================
PATH 1 :- 20:70:00:c0:ff:da:2c:56
================================================
COMMAND :- SUPPORTED VPD PAGES (0x12 / 0x00)
LUN ID :- 0001000000000000
STATUS :- 0
SCSI STATUS :- 0
CDB :- 12010000ff00000000000000000000000
DATA TRANSFER LENGTH :- 32768
RESIDUE TRANSFER LENGTH :- 32759
ACTUAL DATA LENGTH :- 9
DATA :-
00 00 00 05 00 80 83 85 d0
END OF COMMAND
```

The following example shows the `get_target_diagnostics` command using the default option, single command:

```
MPX200 <1> (admin) #> get_target_diagnostics
Index State  (Symbolic Name, WWPN/WWNN,WWPN/iSCSI Name, Ip Address)
----- -----  ------------------------------------------------------
```

```
0     Online  DGC RAID-0, 50:06:01:62:41:e0:49:2e
1     Online HP HSV210-1, 50:00:1f:e1:50:0a:37:19
Please select a Array/Target from the list above ('q' to quit): 1
Index (VpGroup Name)
----- --------------
1     VPGROUP_1
Please select a VpGroup from the list above ('q' to quit): 1
Do you want to execute command on 1)All LUNs 2)Single LUN: ('q' to quit): 2
Index (LUN/VpGroup)
----- -------------
0     0/VPGROUP_1
1     1/VPGROUP_1
2     2/VPGROUP_1
3     3/VPGROUP_1
4     4/VPGROUP_1
5     5/VPGROUP_1
Please select a LUN from above ('q' to quit): 1
Index (Operation)
----- ------------
1     Execute custom command
2     Execute default command set
3     Execute one command from default command set
Please select an Operation from above ('q' to quit): 3
Index (Command)
----- ---------
1     REPORT LUNS
2     STANDARD INQUIRY
3     SUPPORTED VPD PAGE
4     UNIT SERIAL NUMBER VPD PAGE
5     DEVICE IDENTIFICATION VPD PAGE
6     BLOCK LIMITS VPD PAGE
7     THIN PROVISIONING VPD PAGE
8     READ CAPACITY 10
9     READ CAPACITY 16
10    GET LBA STATUS
11    REPORT TARGET PORT GROUP
12    TEST UNIT READY
13    READ
14    REPORT SUPPORTED OP CODES
Please select a command from above ('q' to quit): 2
Do you want to save output in file? [1) Yes 2) No]: 2
Do you want to display output on CLI? [1) Yes 2) No]: 1
USER INPUTS
================================================
TARGET WWPN :- 00:00:02:00:01:00:00:00
================================================
================================================
PATH 0 :- 50:00:1f:e1:50:0a:37:19
================================================
COMMAND :- STANDARD INQUIRY (0x12)
LUN ID :- 0001000000000000
STATUS :- 0
SCSI STATUS :- 0
CDB :- 12000000ff00000000000000000000000
DATA TRANSFER LENGTH :- 32768
RESIDUE TRANSFER LENGTH :- 32516
ACTUAL DATA LENGTH :- 252
DATA :-
00 00 05 12 f7 30 00 32 48 50 20 20 20 20 20 20
48 53 56 32 31 30 20 20 20 20 20 20 20 20 20 20
35 30 30 30 42 35 41 37 41 54 4c 38 34 42 41 32
39 39 41 53 5a 30 32 34 00 00 00 62 0d 80 13 20
08 c0 03 00 03 24 01 60 01 c0 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
91 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 50 00 1f e1 50 0a 37 10 50 00 1f e1 50 0a
37 19 20 30 00 00 00 00 00 00 35 30 30 30 31 46
45 31 35 30 30 41 33 37 31 30 35 30 30 30 31 46
45 31 35 30 30 41 33 37 31 39 36 30 30 35 30 38
42 34 30 30 30 35 34 44 39 34 30 30 30 31 33 30
30 42 46 45 35 41 30 30 30 30 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00
END OF COMMAND
================================================
PATH 1 :- 50:00:1f:e1:50:0a:37:1d
================================================
COMMAND :- STANDARD INQUIRY (0x12)
```

```
LUN ID :- 0001000000000000
STATUS :- 0
SCSI STATUS :- 0
CDB :- 12000000ff00000000000000000000000
DATA TRANSFER LENGTH :- 32768
RESIDUE TRANSFER LENGTH :- 32516
ACTUAL DATA LENGTH :- 252
DATA :-
00 00 05 12 f7 30 00 32 48 50 20 20 20 20 20 20
48 53 56 32 31 30 20 20 20 20 20 20 20 20 20 20
35 30 30 30 41 32 39 39 41 53 5a 30 32 34 42 35
41 37 41 54 4c 38 34 42 00 00 00 62 0d 80 13 20
08 c0 03 00 03 24 01 60 01 c0 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
90 3e 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 05 50 00 1f e1 50 0a 37 10 50 00 1f e1 50 0a
37 1d 20 30 00 00 00 00 00 00 35 30 30 30 31 46
45 31 35 30 30 41 33 37 31 30 35 30 30 30 31 46
45 31 35 30 30 41 33 37 31 44 36 30 30 35 30 38
42 34 30 30 30 35 34 44 39 34 30 30 30 31 33 30
30 42 46 45 35 41 30 30 30 30 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00
END OF COMMAND
```

initiator

Adds a new FC, iSCSI, or FCoE initiator; modifies the OS type of a discovered initiator; or removes a logged-out initiator.

Authority

admin

Syntax

`initiator`

Keywords

`add`	Adds a new FC, iSCSI, or FCoE initiator.
`mod`	Modifies the OS type of a discovered initiator.
`rm`	Removes a logged-out initiator.

Examples

The following example shows the `initiator add` command:

```
MPX200 <1> (admin) #> initiator add

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

Initiator Protocol (0=ISCSI, 1=FC, 2=FCOE) [ISCSI ] 1

Only valid FC name characters will be accepted. Valid characters include
alphabetical (a-z/A-Z), numerical (0-9).

FC Initiator Wwpn(Max = 64 characters) [ ]
50:05:07:68:02:20:13:49
Only valid FC name characters will be accepted. Valid characters include
alphabetical (a-z/A-Z), numerical (0-9).
FC Initiator Wwnn(Max = 64 characters) [ ]
50:05:07:68:02:20:13:50
OS Type (0=Windows, 1=Linux, 2=Solaris,
3=OpenVMS, 4=VMWare, 5=Mac OS X,
```

```
6=Windows2008, 7=HP-UX, 8=AIX,
9=Windows2012, 10=Other) [Windows ]
6-Command Line Interface
Initiator
6-26 ISR654609-00 G

All attribute values that have been changed will now be saved.
```

The following example shows the `initiator mod` command.

```
MPX200 <2> (admin) #> initiator mod

Index Type (WWNN,WWPN/iSCSI Name)
----- ----- ----------------------
0 FC 50:06:01:60:cb:a0:35:de,50:06:01:69:4b:a0:35:de
1 FC 20:01:00:e0:8b:a8:86:02,21:01:00:e0:8b:a8:86:02
2 FC 20:00:00:e0:8b:88:86:02,21:00:00:e0:8b:88:86:02

Please select an Initiator from the list above ('q' to quit): 1
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

OS Type (0=Windows, 1=Linux, 2=Solaris,
3=OpenVMS, 4=VMWare, 5=Mac OS X,
6=Windows2008, 7=HP-UX, 8=AIX,
9=Windows2012, 10=Other) [Windows ]

All attribute values that have been changed will now be saved.
```

The following example shows the `initiator rm` command:

```
MPX200 <1> (admin) #> initiator rm

Warning: This command will cause the removal of all mappings and maskings
associated with the initiator that is selected. All connections
involving the selected initiator will be dropped.

Index Type Status (WWNN,WWPN/iSCSI Name)
----- ---- ------ ----------------------
0 FC LoggedIn 20:00:00:05:1e:b4:45:fb,10:00:00:05:1e:b4:45:fb
1 FC LoggedIn 50:01:43:80:01:31:e2:69,50:01:43:80:01:31:e2:68
2 FC LoggedOut 20:00:00:e0:8b:89:65:44,21:00:00:e0:8b:89:65:44
3 FC LoggedIn 50:06:0b:00:00:1d:1c:fd,50:06:0b:00:00:1d:1c:fc
4 FC LoggedIn 20:00:00:e0:8b:89:17:03,21:00:00:e0:8b:89:17:03
5 FC LoggedIn 50:06:0b:00:00:c1:73:75,50:06:0b:00:00:c1:73:74
6 FC LoggedIn 50:01:10:a0:00:17:60:69,50:01:10:a0:00:17:60:68

Please select a 'LoggedOut' Initiator from the list above ('q' to quit): 2

All attribute values that have been changed will now be saved.
```

iscsi

Discovers the iSCSI target through the router's iSCSI port, and logs in the user to the selected discovered target.

Authority

admin

Syntax

```
iscsi
```

Keywords

`discover`	Discovers the iSCSI target through the router's iSCSI port.
`login`	Logs in the user to a specific discovered iSCSI target and lists all other targets discovered from the `iscsi discover` command.

Examples

The following example shows the `iscsi discover` command:

```
MPX200 <1> (admin) #> iscsi discover
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

IP Address (IPv4 or IPv6) [0.0.0.0 ] 10.1.1.1
TCP Port No. [3260 ]
Outbound Port (1=GE1, 2=GE2, ...) [GE1 ]
Target CHAP (0=Enable, 1=Disable) [Disabled ]
```

The following example shows the `iscsi login` command:

```
MPX200 <1> (admin) (miguser) #> iscsi login
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0  iqn.2003-10.com.lefthandnetworks:qlogic:81:tp4-isns
Please select a Target from the list above ('q' to quit): 0
Index IP Address
----- ----------
0  50.50.50.40

Please select a IP Address from the list above ('q' to quit): 0
TCP Port No. [3260 ]
Outbound Port (1=GE1, 2=GE2, ...) [GE1 ]
Header Digest (0=Enable, 1=Disable) [Disabled ]
Data Digest (0=Enable, 1=Disable) [Disabled ]
```

lunigmap

Maps an iSCSI LUN to an initiator, or removes an iSCSI LUN mapping from an initiator.

Authority

Admin session

Syntax

`lunigmap`

Keywords

`add`	Maps an iSCSI LUN to an initiator using global mapping.
`rm`	Removes the mapping of an iSCSI LUN from an initiator.

Examples

The following example shows the `lunigmap add` command:

```
MPX200 <1> (admin) #> lunigmap add
WARNING
-------
This command should be used to present iSCSI targets that present one LUN per
target.
Index Type  Mapped (WWNN,WWPN/iSCSI Name)
----- ----  ------ ----------------------
0   FC  No   20:00:00:05:1e:b4:45:fb,10:00:00:05:1e:b4:45:fb
1   FC  No   50:01:43:80:01:31:e2:69,50:01:43:80:01:31:e2:68
2   FC  Yes   50:06:0b:00:00:1d:1c:fd,50:06:0b:00:00:1d:1c:fc
3   FC  Yes   20:00:00:e0:8b:89:17:03,21:00:00:e0:8b:89:17:03
4   FC  Yes   50:06:0b:00:00:c1:73:75,50:06:0b:00:00:c1:73:74
5   FC  Yes   50:01:10:a0:00:17:60:69,50:01:10:a0:00:17:60:68
Please select an Initiator from the list above ('q' to quit): 0
Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0   iqn.2001-05.com.equallogic:0-8a0906-188701d01-441d4ed3d014cece-pramod-4
1   iqn.2001-05.com.equallogic:0-8a0906-4de701d01-8b9d4ed3d0d4cee3-pramod-5
2   iqn.2001-05.com.equallogic:0-8a0906-33c701d01-5e5d4ed3d104cee4-pramod-6
3   iqn.2001-05.com.equallogic:0-8a0906-d11a53601-e641c5a3cc54db53-pramod-dml
Please select a Target from the list above ('q' to quit): 0
Index (VpGroup Name)
----- --------------
1   VPGROUP_1
Multiple VpGroups are currently 'ENABLED'.
Please select a VpGroup from the list above ('q' to quit): 1
Index (LUN/VpGroup)  Serial Number/WWULN
----- -------------  -------------------
0   0/VPGROUP_1  6090A018D0018718CECE14D0D34E1D44
        60:90:a0:18:d0:01:87:18:ce:ce:14:d0:d3:4e:1d:44
Please select a LUN to present to the initiator ('q' to quit): 0
Please Assign a ID which maps the initiator to the LUN: [0 ]:
All attribute values that have been changed will now be saved.
Use the targetmap add command with VPGroup Global for presenting the target.
```

The following example shows the `lunigmap rm` command:

```
MPX200 <1> (admin) #> lunigmap rm
Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0   50:00:1f:e1:50:0a:e1:40,50:00:1f:e1:50:0a:e1:48
1   50:00:1f:e1:50:0a:e1:40,50:00:1f:e1:50:0a:e1:4c
2   50:00:1f:e1:50:0a:37:10,50:00:1f:e1:50:0a:37:18
3   50:00:1f:e1:50:0a:37:10,50:00:1f:e1:50:0a:37:1c
4   50:06:01:60:c1:e0:49:2e,50:06:01:62:41:e0:49:2e
5   50:06:01:60:c1:e0:49:2e,50:06:01:6a:41:e0:49:2e
6   50:0a:09:80:88:cd:63:f5,50:0a:09:81:88:cd:63:f5
7   50:0a:09:80:88:cd:63:f5,50:0a:09:81:98:cd:63:f5
8   iqn.2001-05.com.equallogic:0-8a0906-188701d01-441d4ed3d014cece-pramod-4
9   iqn.2001-05.com.equallogic:0-8a0906-4de701d01-8b9d4ed3d0d4cee3-pramod-5
10   iqn.2001-05.com.equallogic:0-8a0906-33c701d01-5e5d4ed3d104cee4-pramod-6
11   iqn.2001-05.com.equallogic:0-8a0906-d11a53601-e641c5a3cc54db53-pramod-dml
Please select a Target from the list above ('q' to quit): 0
Index (VpGroup Name)
----- --------------
1   VPGROUP_1
2   VPGROUP_2
3   VPGROUP_3
4   VPGROUP_4
Multiple VpGroups are currently 'ENABLED'.
Please select a VpGroup from the list above ('q' to quit): 2
Index (LUN/VpGroup)  Serial Number/WWULN
----- -------------  -------------------
0   0/VPGROUP_2  PB5A8C3AATK8BW
        50:00:1f:e1:50:0a:e1:40
1   1/VPGROUP_2  PB5A8C3AATK8BW
        60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:59:00:00
2   2/VPGROUP_2  PB5A8C3AATK8BW
        60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5c:00:00
3   3/VPGROUP_2  PB5A8C3AATK8BW
        60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5f:00:00
4   4/VPGROUP_2  PB5A8C3AATK8BW
```

```
        60:05:08:b4:00:07:59:a4:00:02:e0:00:07:15:00:00
5   5/VPGROUP_2  PB5A8C3AATK8BW
        60:05:08:b4:00:07:59:a4:00:02:e0:00:07:18:00:00
Please select a LUN presented to the initiator ('q' to quit): 0
Index MappedId  Type  Initiator
----- --------  ----  ---------
0   0     FC  50:06:0b:00:00:c1:73:75
1   0     FC  50:01:10:a0:00:17:60:69
2   0     FC  20:00:00:05:1e:b4:45:fb
Please select an Initiator to remove ('a' to remove all, 'q' to quit): 2
All attribute values that have been changed will now be saved.
```

lunmask

Maps or removes, according to keyword, a target LUN mapping to an initiator. The CLI prompts you to select from a list of virtual port groups, targets, LUNs, and initiators, and to present the target if it is not already presented.

Authority

admin

Syntax

`lunmask`

Keywords

`add`	Maps a LUN to an initiator.
`remove`	Removes the mapping of a LUN from an initiator.

Examples

The following example shows the `lunmask add` command:

```
MPX200 <1> (admin) #> lunmask add
Index Type  Mapped  (WWNN,WWPN/iSCSI Name)
----- ----  ------  ----------------------
0     FC    Yes      20:00:00:1b:32:0a:61:80,21:00:00:1b:32:0a:61:80
Please select an Initiator from the list above ('q' to quit): 0
Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0      50:0a:09:80:85:95:82:2c,50:0a:09:81:85:95:82:2c
1      20:00:00:14:c3:3d:cf:88,21:00:00:14:c3:3d:cf:88
2      0:00:00:14:c3:3d:d3:25,21:00:00:14:c3:3d:d3:25
3      50:06:01:60:cb:a0:35:f6,50:06:01:68:4b:a0:35:f6
4      50:06:01:60:cb:a0:35:f6,50:06:01:60:4b:a0:35:f6
Please select a Target from the list above ('q' to quit): 0
Index  (LUN/VpGroup)
------ -------------
0      0/VPGROUP_1
1      1/VPGROUP_1
2      2/VPGROUP_1
Please select a LUN to present to the initiator ('q' to quit): 1
Index (IP/WWNN)       (MAC/WWPN)
----- -----------      ------------
0      0.0.0.0                  00-c0-dd-13-2c-c4
1      0.0.0.0                  00-c0-dd-13-2c-c5
2      20:00:00:c0:dd:13:2c:c4  21:00:00:c0:dd:13:2c:c4
3      20:00:00:c0:dd:13:2c:c5  21:00:00:c0:dd:13:2c:c5
Please select a portal to map the target from the list above ('q' to quit): 2
Target Device is already mapped on selected portal.
All attribute values that have been changed will now be saved.
```

The following example shows the `lunmask rm` command:

```
MPX200 <1> (admin) #> lunmask rm
Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0      50:0a:09:80:85:95:82:2c,50:0a:09:81:85:95:82:2c
```

```
1     20:00:00:14:c3:3d:cf:88,21:00:00:14:c3:3d:cf:88
2     20:00:00:14:c3:3d:d3:25,21:00:00:14:c3:3d:d3:25
3     50:06:01:60:cb:a0:35:f6,50:06:01:68:4b:a0:35:f6
4     50:06:01:60:cb:a0:35:f6,50:06:01:60:4b:a0:35:f6
Please select a Target from the list above ('q' to quit): 0
Index (LUN/VpGroup)
----- -------------
0     0/VPGROUP_1
1     1/VPGROUP_1
2     2/VPGROUP_1
Please select a LUN presented to the initiator ('q' to quit): 1
Index Type Initiator
----- ---- -----------------
0     FC   20:00:00:1b:32:0a:61:80
Please select an Initiator to remove ('a' to remove all, 'q' to quit): 0
All attribute values that have been changed will now be saved.
```

lunremap

Maps or removes a target LUN mapping to an initiator.

Authority

admin

Syntax

`lunremap`

Keywords

`add`	Maps a LUN to an initiator with any different LUN ID.
`rm`	Removes the mapping of a LUN from an initiator.

Examples

The following example shows the `lunremap add` command:

```
MPX200 <1> (admin) #> lunremap add
Index Type Mapped (WWNN,WWPN/iSCSI Name)
----- ---- ------ ----------------------
0     FC    No    20:00:00:05:1e:b4:45:fb,10:00:00:05:1e:b4:45:fb
1     FC    No    50:01:43:80:01:31:e2:69,50:01:43:80:01:31:e2:68
2     FC    Yes   50:06:0b:00:00:1d:1c:fd,50:06:0b:00:00:1d:1c:fc
3     FC    Yes   20:00:00:e0:8b:89:17:03,21:00:00:e0:8b:89:17:03
4     FC    Yes   50:06:0b:00:00:c1:73:75,50:06:0b:00:00:c1:73:74
5     FC    Yes   50:01:10:a0:00:17:60:69,50:01:10:a0:00:17:60:68
Please select an Initiator from the list above ('q' to quit): 0
Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0     50:00:1f:e1:50:0a:e1:40,50:00:1f:e1:50:0a:e1:48
1     50:00:1f:e1:50:0a:e1:40,50:00:1f:e1:50:0a:e1:4c
2     50:00:1f:e1:50:0a:37:10,50:00:1f:e1:50:0a:37:18
3     50:00:1f:e1:50:0a:37:10,50:00:1f:e1:50:0a:37:1c
4     50:06:01:60:c1:e0:49:2e,50:06:01:62:41:e0:49:2e
5     50:06:01:60:c1:e0:49:2e,50:06:01:6a:41:e0:49:2e
6     50:0a:09:80:88:cd:63:f5,50:0a:09:81:88:cd:63:f5
7     50:0a:09:80:88:cd:63:f5,50:0a:09:81:98:cd:63:f5
Please select a Target from the list above ('q' to quit): 0
Index (VpGroup Name)
----- --------------
1      VPGROUP_1
2      VPGROUP_2
```

```
Multiple VpGroups are currently 'ENABLED'.
Please select a VpGroup from the list above ('q' to quit): 2
Index (LUN/VpGroup)  Serial Number/WWULN
-----  -------------  -------------------
0       0/VPGROUP_2    PB5A8C3AATK8BW
                       50:00:1f:e1:50:0a:e1:40
1       1/VPGROUP_2    PB5A8C3AATK8BW
                       60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:59:00:00
2      2/VPGROUP_2     PB5A8C3AATK8BW
                       60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5c:00:00
3      3/VPGROUP_2     PB5A8C3AATK8BW
                       60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5f:00:00
4      4/VPGROUP_2     PB5A8C3AATK8BW
                       60:05:08:b4:00:07:59:a4:00:02:e0:00:07:15:00:00
5      5/VPGROUP_2     PB5A8C3AATK8BW
                       60:05:08:b4:00:07:59:a4:00:02:e0:00:07:18:00:00
Please select a LUN to present to the initiator ('q' to quit): 0
Please Assign a ID which maps the initiator to the LUN: [0 ]:
All attribute values that have been changed will now be saved.
Use the targetmap add command with VPGroup Global for presenting the target.
```

The following example shows the `lunremap rm` command:

```
MPX200 <1> (admin) #> lunremap rm
Index (WWNN,WWPN/iSCSI Name)
-----  ----------------------
0    50:00:1f:e1:50:0a:e1:40,50:00:1f:e1:50:0a:e1:48
1      50:00:1f:e1:50:0a:e1:40,50:00:1f:e1:50:0a:e1:4c
2      50:00:1f:e1:50:0a:37:10,50:00:1f:e1:50:0a:37:18
3      50:00:1f:e1:50:0a:37:10,50:00:1f:e1:50:0a:37:1c
4      50:06:01:60:c1:e0:49:2e,50:06:01:62:41:e0:49:2e
5      50:06:01:60:c1:e0:49:2e,50:06:01:6a:41:e0:49:2e
6      50:0a:09:80:88:cd:63:f5,50:0a:09:81:88:cd:63:f5
7      50:0a:09:80:88:cd:63:f5,50:0a:09:81:98:cd:63:f5
8      iqn.2001-05.com.equallogic:0-8a0906-188701d01-441d4ed3d014cece-pramod-4
9      iqn.2001-05.com.equallogic:0-8a0906-4de701d01-8b9d4ed3d0d4cee3-pramod-5
10     iqn.2001-05.com.equallogic:0-8a0906-33c701d01-5e5d4ed3d104cee4-pramod-6
11     iqn.2001-05.com.equallogic:0-8a0906-d11a53601-e641c5a3cc54db53-pramod-dml
Please select a Target from the list above ('q' to quit): 0
Index (VpGroup Name)
-----  --------------
1       VPGROUP_1
2       VPGROUP_2
3       VPGROUP_3
4       VPGROUP_4
Multiple VpGroups are currently 'ENABLED'.
Please select a VpGroup from the list above ('q' to quit): 2
Index (LUN/VpGroup) Serial Number/WWULN
-----  ------------- -------------------
0       0/VPGROUP_2    PB5A8C3AATK8BW
                       50:00:1f:e1:50:0a:e1:40
1       1/VPGROUP_2   PB5A8C3AATK8BW
                       60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:59:00:00
2       2/VPGROUP_2   PB5A8C3AATK8BW
                       60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5c:00:00
3       3/VPGROUP_2   PB5A8C3AATK8BW
                       60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5f:00:00
4       4/VPGROUP_2   PB5A8C3AATK8BW
                       60:05:08:b4:00:07:59:a4:00:02:e0:00:07:15:00:00
5       5/VPGROUP_2   PB5A8C3AATK8BW
                       60:05:08:b4:00:07:59:a4:00:02:e0:00:07:18:00:00
Please select a LUN presented to the initiator ('q' to quit): 0
Index MappedId Type Initiator
-----  --------  ----  ---------
0      0         FC    50:06:0b:00:00:c1:73:75
1      0         FC    50:01:10:a0:00:17:60:69
2      0         FC    20:00:00:05:1e:b4:45:fb
Please select an Initiator to remove ('a' to remove all, 'q' to quit): 2
All attribute values that have been changed will now be saved.
```

migration

Manages data migration jobs, including scheduling, starting, stopping, pausing, resuming, and deleting jobs, as well as acknowledging completed jobs.

Authority

miguser

Syntax

```
migration
```

Keywords

`acknowledge`	Acknowledges a completed data migration job. After running the command with this option, the migration job is permanently deleted from the database.
`add`	Schedules a data migration job. You can enter a name for the data migration job and associate it with a job group. Scheduling options include: immediately, at a pre-defined later time, or by serial scheduling. Serial scheduling requires that you assign a priority to the job that is used to schedule it before (lower priority value) or after (higher priority value) a specific job in the serial schedule queue of data migration jobs.
`pause`	Pauses a running migration job. This keyword freezes the migration process. You can later resume the job from the block where the migration was paused.
`resume`	Resumes a paused data migration job. The job is resumed from the block where the data migration was paused.
`rm`	Deletes a data migration job.
`rm_peer`	Deletes migration jobs that are owned by the peer blade while the peer blade is down. If the peer blade is up and running, this keyword does not allow job deletion.
`start`	Restarts a previously stopped migration job. The migration process starts over from the first block.
`stop`	Stops running the data migration job. Use this command if you want to later restart the migration process due to some technical or business need. You can also use it on already scheduled jobs to change the scheduling time.

Examples

The following example shows the `migration acknowledge` command for an *offline* data migration job:

```
MPX200 <1> (miguser) #> migration acknowledge
Job Type     Status                          Job Description
ID
--- ----     ------------------------ -------------------------------------
0  Offline   Completed (100%)          HP HSV200-0:LUN1 to DGC RAID-1:LUN0
Please select a Job Id from the list above ('q' to quit): 0
```

The following example shows the `migration add` command used to configure an *offline* data migration job:

```
MPX200 <1> (miguser) #> migration add
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Migration Type [ 1=Offline (Local/Remote),
2=Online (Local),
3=Online (Remote) ] [ ] 1
1
Index WWPN, PortId/ iScsiName, Ip Add    Symbolic Name          Target Type
----- -------------------------------  --------------------   -------------
0     50:00:1f:e1:50:0a:e1:49, 8c-02-00  HP HSV200-0            Src+Dest
1     50:00:1f:e1:50:0a:37:18, 82-04-00  HP HSV210-2            Src+Dest
2     50:06:01:62:41:e0:49:2e, 82-01-00  DGC RAID-2             Src+Dest
3     iqn.2001-05.com., 30.30.30.2   EQLOGIC 100E-00-7      Src+Dest
4     iqn.2001-05.com., 30.30.30.2   EQLOGIC 100E-00-8      Src+Dest
5     50:0a:09:82:88:8c:a7:79, 61-12-00  NETAPP LUN-3          Src+Dest
Please select a Source Target from the list above ('q' to quit): 0
Index (VpGroup Name)
----- --------------
1     VPGROUP_1
Please select a VPGroup for Source Lun ('q' to quit): 1
LUN Vendor LUN Size(GB)   Attributes  Serial Number/WWULN
--- ------ -------------- ---------- --------------------
1     HP    10.00         PB5A8C3AATK8BW
                          60:05:08:b4:00:07:59:a4:00:02:d0:00:00:8d:00:00
2     HP    10.00         PB5A8C3AATK8BW
                          60:05:08:b4:00:07:59:a4:00:02:d0:00:00:90:00:00
3     HP    12.00         PB5A8C3AATK8BW
```

```
                          60:05:08:b4:00:10:6b:ac:00:02:f0:00:00:b6:00:00
4     HP    10.00         PB5A8C3AATK8BW
                          60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:59:00:00
5     HP    10.00         PB5A8C3AATK8BW
                          60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5c:00:00
6     HP    10.00         PB5A8C3AATK8BW
                          60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5f:00:00
7     HP    10.00         PB5A8C3AATK8BW
                          60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:62:00:00
8     HP    10.00         PB5A8C3AATK8BW
                          60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:65:00:00
9     HP    100.00         DATA MGMT PB5A8C3AATK8BW
                          60:05:08:b4:00:10:6b:ac:00:02:a0:00:00:af:00:00
10    HP    3.00          PB5A8C3AATK8BW
                          60:05:08:b4:00:07:59:a4:00:02:e0:00:05:91:00:00
11    HP    4.00          PB5A8C3AATK8BW
                          60:05:08:b4:00:07:59:a4:00:02:e0:00:05:94:00:00

Please select a LUN as a Source Lun ('q' to quit): 2

Index WWPN, PortId/ iScsiName, Ip Add  Symbolic Name    Target Type
----- -------------------------------- -------------------- ------------
0     50:00:1f:e1:50:0a:e1:49, 8c-02-00  HP HSV200-0         Src+Dest
1     50:00:1f:e1:50:0a:37:18, 82-04-00  HP HSV210-2         Src+Dest
2     50:06:01:62:41:e0:49:2e, 82-01-00  DGC RAID-2          Src+Dest
3     iqn.2001-05.com., 30.30.30.2       EQLOGIC 100E-00-7   Src+Dest
4     iqn.2001-05.com., 30.30.30.2       EQLOGIC 100E-00-8   Src+Dest
5     50:0a:09:82:88:8c:a7:79, 61-12-00 NETAPP LUN-3         Src+Dest

Please select a Destination Target from the list above ('q' to quit): 5

Index (VpGroup Name)
----- --------------
1      VPGROUP_1

Please select a VPGroup for Destination Lun ('q' to quit): 1

LUN  Vendor  LUN Size( GB)    Attributes Serial Number/WWULN
---  ------  --------------  ---------- -------------------
1     NETAPP   12.00     P3TPeJZ4dMV6
                              NETAPP LUN P3TPeJZ4dMV6
2     NETAPP   12.00     P3TPeJZ5qEQ5
                              NETAPP LUN P3TPeJZ5qEQ5
3     NETAPP   12.00     P3TPeJZ5qEnA
                              NETAPP LUN P3TPeJZ5qEnA
4     NETAPP   10.00             P3TPeJ/UDPrh

Please select a LUN as a Destination Lun('q' to quit): 1
Is destination LUN a thin provisioned LUN [y/n]: y
Do you wish to validate data on destination LUN [y/n]: y
I/O Size (0=32KB, 1=64KB, 2=128KB, 3=512KB, 4=1MB) [64KB ]
Please Enter a Job Description (Max = 64 characters)
default name [ HP HSV200-0:VPG1:002 to NETAPP LUN-3:VPG1:001 ]
Verify Data after Migration job is complete?(1=Yes, 2=No) [Yes ]

Index Group Owner Group Name
----- ----------- ----------
0     2           Group 0
1     2           Test1

Please select a Group that this Job should belong to [0]
Start Time (1=Now, 2=Delayed, 3=JobSerialScheduling, 4=ConfigureOnly) [Now ]
Successfully created Job
All attribute values for that have been changed will now be saved.
```

The following example shows the `migration add` command used for configuring an *online* data migration job:

```
MPX200 <1> (admin) (miguser) #> migration add
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Migration Type [ 1=Offline (Local/Remote),
2=Online (Local),
3=Online (Remote) ] [ ] 2
Index WWPN, PortId/ iScsiName, Ip Add   Symbolic Name          Target Type
----- -------------------------------- --------------------  ------------
0     50:06:01:62:41:e0:49:2e, 61-00-00 DGC RAID-0             Src+Dest
1     50:00:1f:e1:50:0a:37:19, 82-0c-00 HP HSV210-1            Src+Dest

Please select a Source Target from the list above ('q' to quit): 0

Index (VpGroup Name)
----- --------------
1     VPGROUP_1

Please select a VPGroup for Source LUN ('q' to quit): 1

LUN Vendor  LUN Size( GB) Attributes Serial Number/WWULN
--- ------  -------------- ---------- -------------------
2   DGC     2.000          APM00070900914
                           60:06:01:60:a0:40:21:00:50:e8:02:2f:22:eb:e0:11
3   DGC     2.000          APM00070900914
                           60:06:01:60:a0:40:21:00:16:39:31:64:82:ed:e0:11
4   DGC     2.000          APM00070900914
                           60:06:01:60:a0:40:21:00:68:48:f4:64:99:ed:e0:11
5   DGC     2.000          APM00070900914
```

```
                            60:06:01:60:a0:40:21:00:69:48:f4:64:99:ed:e0:11
6   DGC     2.000           APM00070900914
                            60:06:01:60:a0:40:21:00:b4:59:85:ba:b4:ed:e0:11
7   DGC     2.000           APM00070900914
                            60:06:01:60:a0:40:21:00:b5:59:85:ba:b4:ed:e0:11
8   DGC     2.000           APM00070900914
                            60:06:01:60:a0:40:21:00:be:b4:e5:ff:4e:ee:e0:11
9   DGC     2.000           APM00070900914
                            60:06:01:60:a0:40:21:00:bf:b4:e5:ff:4e:ee:e0:11
Please select a LUN as a Source Lun ('q' to quit): 2
Index WWPN, PortId/ iScsiName, Ip Add  Symbolic Name    Target Type
----- -------------------------------- -------------------- ------------
0   50:06:01:62:41:e0:49:2e, 61-00-00 DGC RAID-0     Src+Dest
1   50:00:1f:e1:50:0a:37:19, 82-0c-00 HP HSV210-1    Src+Dest

Please select a Destination Target from the list above ('q' to quit): 1

Index (VpGroup Name)
----- --------------
1   VPGROUP_1

Please select a VPGroup for Destination LUN ('q' to quit): 1
LUN Vendor LUN Size( GB)     Attributes Serial Number/WWULN
--- ------ --------------    ---------- -------------------
1   HP     10.000            PA299B1AASZ024
                             60:05:08:b4:00:05:4d:94:00:01:30:0b:fe:5a:00:00
2   HP     10.000            PA299B1AASZ024
                             60:05:08:b4:00:05:4d:94:00:01:30:0b:fe:5d:00:00
3   HP     10.000            PA299B1AASZ024
                             60:05:08:b4:00:05:4d:94:00:01:30:0b:fe:60:00:00
4   HP     10.000             PA299B1AASZ024
                             60:05:08:b4:00:05:4d:94:00:01:30:0b:fe:63:00:00
5   HP     100.000           PA299B1AASZ024
                             60:05:08:b4:00:05:4d:b0:00:01:50:1a:94:ad:00:00

Please select a LUN as a Destination Lun('q' to quit): 1
Is destination LUN a thin provisioned LUN [y/n]: n
I/O Size (0=32KB, 1=64KB, 2=128KB, 3=512KB, 4=1MB) [64KB ]

Please Enter a Job Description (Max = 127 characters)
default name [ DGC RAID-0:VPG1:002 to HP HSV210-1:VPG1:001 ]

Index Group Owner Group Name
----- ----------- ----------
0   1 Group    0
Please select a Group that this Job should belong to [0]
Start Time (1=Now, 2=Delayed, 3=JobSerialScheduling, 4=ConfigureOnly) [Now ]
Successfully created Job
All attribute values for that have been changed will now be saved.
```

The following example shows the `migration add` command used to configure a remote online data migration job:

```
MPX200 <2> (admin) (miguser) #> migration add
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Migration Type [ 1=Offline (Local/Remote),
2=Online (Local),
3=Online (Remote) ] [ ] 3
Index WWPN, PortId/ iScsiName, Ip Add    Symbolic Name        Target Type
----- -------------------------------- --------------------  ------------
0     50:06:01:62:41:e0:49:2e, 61-00-00  DGC RAID-0           Src+Dest
1     50:00:1f:e1:50:0a:37:19, 82-0c-00  HP HSV210-1          Src+Dest

Please select a Source Target from the list above ('q' to quit): 0

Index (VpGroup Name)
----- --------------
1     VPGROUP_1

Please select a VPGroup for Source LUN ('q' to quit): 1
LUN  Vendor  LUN Size( GB)  Attributes Serial Number/WWULN
---  ------  -------------- ---------- -------------------
2     DGC      2.000         APM00070900914
                             60:06:01:60:a0:40:21:00:50:e8:02:2f:22:eb:e0:11
3     DGC      2.000         APM00070900914
                             60:06:01:60:a0:40:21:00:16:39:31:64:82:ed:e0:11
4     DGC      2.000         APM00070900914
                             60:06:01:60:a0:40:21:00:68:48:f4:64:99:ed:e0:11
5     DGC      2.000         APM00070900914
                             60:06:01:60:a0:40:21:00:69:48:f4:64:99:ed:e0:11
6     DGC      2.000         APM00070900914
                             60:06:01:60:a0:40:21:00:b4:59:85:ba:b4:ed:e0:11
7     DGC      2.000         APM00070900914
                             60:06:01:60:a0:40:21:00:b5:59:85:ba:b4:ed:e0:11
8     DGC      2.000         APM00070900914
                             60:06:01:60:a0:40:21:00:be:b4:e5:ff:4e:ee:e0:11
9     DGC      2.000         APM00070900914
                             60:06:01:60:a0:40:21:00:bf:b4:e5:ff:4e:ee:e0:11
Please select a LUN as a Source Lun ('q' to quit): 4
Index WWPN, PortId/ iScsiName, Ip Add    Symbolic Name        Target Type
----- -------------------------------- --------------------  ------------
```

```
0     50:06:01:62:41:e0:49:2e, 61-00-00  DGC RAID-0           Src+Dest
1     50:00:1f:e1:50:0a:37:19, 82-0c-00  HP HSV210-1          Src+Dest
Please select a Destination Target from the list above ('q' to quit): 1
Index (VpGroup Name)
----- --------------
1      VPGROUP_1
Please select a VPGroup for Destination LUN ('q' to quit): 1
LUN  Vendor  LUN Size( GB)   Attributes Serial Number/WWULN
---  ------  --------------  ---------- ------------------
1     HP       10.000           PA299B1AASZ024
                                60:05:08:b4:00:05:4d:94:00:01:30:0b:fe:5a:00:00
2     HP       10.000           PA299B1AASZ024
                                60:05:08:b4:00:05:4d:94:00:01:30:0b:fe:5d:00:00
3     HP       10.000           PA299B1AASZ024
                                60:05:08:b4:00:05:4d:94:00:01:30:0b:fe:60:00:00
4     HP       10.000           PA299B1AASZ024
                                60:05:08:b4:00:05:4d:94:00:01:30:0b:fe:63:00:00
5     HP       100.000          DATA MGMT PA299B1AASZ024
                                60:05:08:b4:00:05:4d:b0:00:01:50:1a:94:ad:00:00
Please select a LUN as a Destination Lun('q' to quit): 1
Destination LUN appears to contain some valid data.
Are you sure you want to continue? (y/n) : y
Is destination LUN a thin provisioned LUN [y/n]: n
I/O Size (0=32KB, 1=64KB, 2=128KB, 3=512KB, 4=1MB) [64KB ]
Please Enter a Job Description (Max = 127 characters)
default name [ DGC RAID-0:VPG1:004 to HP HSV210-1:VPG1:001 ]
Index Group Owner Group Name
----- ----------- ----------
0      1          Group 0
Please select a Group that this Job should belong to [0]
Start Time (1=Now, 2=Delayed, 3=JobSerialScheduling, 4=ConfigureOnly) [Now ]
Successfully created Job
All attribute values for that have been changed will now be saved.
```

To schedule an individual data migration job in the CLI:

1. Log into the MPX200 as guest and enter the password.
2. Open a miguser session using the following command:

   `miguser start -p migration`

   (The default password for miguser is *migration*.)
3. To create a migration job, enter the following command:

   `migration add`
4. When the CLI prompts you to select a migration type, enter either `1` to select Offline (Local or Remote), `2` to select Online (Local), or `3` to select Online (Remote).

   The CLI lists the source arrays that you have previously defined and prompts you to select one.
5. Select a source array.
   From the selected *source* array, the CLI lists the VP Groups.
6. Select a VP Group for the Source LUN.

   The CLI lists the LUNs that have been exposed to the selected VP Group on the MPX200 for migration and prompts you to select one LUN.
7. Select a LUN for data migration.

   The CLI lists the destination arrays that you have previously defined.
8. Select a VP Group for the destination LUN.
   From the selected destination array, the CLI lists the LUNs that have been exposed to the MPX200 for migration.
9. Select one LUN. The destination LUN you select should not be a part of any other job, and its size should be equal to or greater than the source LUN.

The MPX200 warns you if it detects any valid metadata on the destination LUN. However, you can continue and use the LUN for migration if you are aware of the consequences and want to continue with the job scheduling.

10. Specify whether the destination LUN is a thin-provisioned LUN, and if "yes", then specify whether to validate the data on that LUN.
11. At the prompts, specify the I/O size, job name, migration group, and scheduling type.
    a. Enter an I/O size between 32 K and 1 MB to optimize migration performance based on the storage array under consideration.
    b. (Optional) Enter a job name (maximum of 64 characters) to identify the job.
    c. (Optional) For an offline migration job, select the option to verify data after the migration job is complete.
    d. Select one of the available migration groups.
    e. Select a `Migration Start Time`: `1=Now`, `2=Delayed`, `3=JobSerialScheduling`, or `4=ConfigureOnly`.
       - If you choose `Delayed`, the CLI prompts you to input the date and time to begin job execution.
       - If you choose `JobSerialScheduling`, the CLI prompts you to to assign a priority level at which the job should be started when all the serial scheduled jobs are executed. The priority can range between 1 and 256. The jobs with priority 1 are executed before the scheduler executes jobs with priority 2.

    The CLI informs you if the migration job is created successfully, and saves any changes you have made.
    The MPX200 then schedules a migration job based on your inputs.

See the preceding examples for the prompts and output of the `migration add` command for offline, online, and remote data migration.

The following example shows the `migration pause` command:

```
MPX200 <1> (miguser) #> migration pause
Job Type    Status                    Job Description
ID
--- ----    ------------------------ ------------------------------------
0   Offline Running ( 67%)            HP HSV200-0:LUN1 to DGC RAID-1:LUN0
Please select a Job Id from the list above ('q' to quit): 0
All attribute values for that have been changed will now be saved.
```

The following example shows the `migration resume` command:

```
MPX200 <1> (miguser) #> migration resume
Job Type    Status                   Job Description
ID
--- ----    ------------------------ ------------------------------------
0   Offline Paused ( 80%)            HP HSV200-0:LUN1 to DGC RAID-1:LUN0
Please select a Job Id from the list above ('q' to quit): 0
All attribute values for that have been changed will now be saved.
```

The following example shows the `migration rm` command:

```
MPX200 <1> (miguser) #> migration rm
Job Type      Status                    Job Description
ID
--- ----      ----------------------- ------------------------------------
0   Offline   Running ( 5%)            DGC RAID-2:VPG4:001 to HP HSV210-3
Please select a Job Id from the list above ('q' to quit): 0
Do you wish to continue with the operation(yes/no)? [No] yes
All attribute values for that have been changed will now be saved.
```

The following example shows the `migration rm_peer` command when the peer blade is down:

```
MPX200 <1> (miguser) #> migration rm_peer
Job Type      Status                    Job Description
ID
--- ----      ------------------------ -------------------------------------
0   Offline.. Completed (100%)          HP HSV200-0:VPG1:004 to HP HSV210-...
Please select a Job Id from the list above ('q' to quit): 0
Do you wish to continue with the operation(yes/no)? [No] yes
All attribute values for that have been changed will now be saved.
```

The following example shows the `migration rm_peer` command when the peer blade is up and running:

```
MPX200 <1> (miguser) #> migration rm_peer
Peer router is up. Cannot remove migration job(s) from peer router.
```

The following example shows the `migration start` command:

```
MPX200 <1> (miguser) #> migration start
Job Type     Status                   Job Description
ID
--- -------- ----------------------- -----------------------------------
0   Offline  Stopped                  HP HSV200-0:LUN1 to DGC RAID-1:LUN0
Please select a Job Id from the list above ('q' to quit): 0
Start Time for JobId 0:(1=Now, 2=Delayed, 3=JobSerialScheduling) [Now ] 2
Please specify a Date & Time (in MMddhhmnmCCYY format)
when the scheduled job should start. This should be
within the next 30 days. [ ] 121215002011
All attribute values for that have been changed will now be saved.
```

The following example shows the `migration stop` command:

```
MPX200 <1> (miguser) #> migration stop
Job Id Type     Status            LUN ID LUN Size(MB) Src Symbolic Name
------ ----     ----------------- ------ ------------ -----------------
0      Offline  Scheduled         7 10000             HP MSA-1
1 Offline Running ( 4%) 8 10000 HP MSA-1
Please select a Migration Job Id from the list above ('q' to quit): 1
All attribute values for that have been changed will now be saved.
```

migration_group

Manages data migration job groups, including creating, renaming, and deleting groups.

Authority

miguser

Syntax

`migration_group`

Keywords

`add` Creates a data migration job group that you can use to combine migration jobs to simplify scheduling and monitoring of data migration processes.

`edit` Renames an already existing data migration job group. Use this keyword to correct spelling mistakes that might have occurred when you typed the name while creating the data migration job group.

`rm` Deletes or removes an existing data migration group that is not required in any of the new data migration jobs that need to be scheduled. You may need to delete groups because there is a limit of eight groups into which the MPX200 can classify data migration jobs. The migration group can be deleted only when no jobs are configured in it.

Examples

The following example shows the `migration_group add` command:

```
MPX200 <1> (miguser) #> migration_group add
Please Enter Group Name that you want to create (Min = 4 Max = 64 characters)
MS_Exchg_2
Sucessfully created Group MS_Exchg_2
```

To create a data migration job group in the CLI:

1. Log in to the MPX200 as `guest` and enter the password.
2. Open a miguser session using the following command:

   `miguser start -p migration`

   (The default password for miguser is *migration*.)
3. Create a migration group using the following command:

   `migration_group add`
4. At the prompt, enter a name for the new group. The name must be a minimum of 4 and a maximum of 64 alphanumeric characters. You can create a maximum of eight job groups in addition to the default job group.

The following example shows the `migration_group edit` command:

```
MPX200 <1> (miguser) #> migration_group edit
Index Group Name
----- ----------
0   Group 0
1   DM_1
2   DM_2
Please select a Group to be updated ('q' to quit): 0
Please Enter New Group Name (Min = 4 Max =
```

The following example shows the `migration_group rm` command:

```
MPX200 <1> (miguser) #> migration_group rm
Index Group Name
----- ----------
1   DM_1
2   DM_2
Please select a Group to be removed ('q' to quit): 1
Sucessfully removed Group DM_1
```

migration_parameters

Sets global data migration parameters, including flush intervals and automatic failover.

Authority

miguser

Syntax

`migration_params`

Keywords

`set` Sets global data migration options.

Example

The following example shows the `migration_params` command:

```
MPX200 <1> (miguser) #> migration_params set

Local Migration Periodic Flush Interval (Secs, Min=30 ) [30 ]
Remote Migration Periodic Flush Interval (Secs, Min=300 ) [900 ]
Job Auto-failover Timer (Secs, Min=600 ) [900 ] 600
Job Auto-failover Policy (1=Disabled, 2=Enabled) [2 ]

Successfully Modified Migration Global Parameters
```

migration_report

Saves and uploads data migration reports in several file formats. To see example output from a generated migration report, see "Generating a data migration report" (page 73).

Authority

miguser

Syntax

```
migration_report
```

Keywords

`save` Saves data migration report files.

`upload` Uploads the data migration report files to a server.

Notes

To generate a data migration report:

1. On the MPX200, issue the `migration_report save` command.
   The generated report is saved in the `/var/ftp` folder of the blade where the command is issued.
2. From a Windows or Linux machine, FTP to the MPX200 blade's IP address where the report was generated, and then get the report file named `Migration_report.tar.gz`.

Examples

The following example shows the `migration_report save` command:

```
MPX200 <1> (miguser) #> migration_report save
Successfully saved migration report. Package is Migration_Report.tar.gz
Please use FTP to extract the file out from the System.
```

The following example shows the `migration_report upload` command:

```
MPX200 <1> (admin) (miguser) #> migration_report upload
Migration report uploaded successfully on
http://172.35.14.183/put.php.
```

readjust_priority

Modifies the priority of serial scheduled jobs. Use this feature if you have more than 256 jobs that must be executed sequentially. This operation is allowed only if the high priority jobs are completed, and there is room for shifting the priority values on already configured jobs. This readjustment reduces the priority value of the last job from 256 by the value of the priority of the currently running serial job, and makes room to configure more serial jobs.

Authority

miguser

Syntax

```
readjust_priority
```

Examples

The following shows an example of the `readjust priority` command.

```
MPX200 <1> (miguser) #> readjust_priority
Are you sure you want to adjust the priorities of serially
scheduled jobs that haven't started (y/n): y
```

```
Priorities have been successfully re-adjusted.
```

remotepeer

Identifies the remote router used at a remote site. The remote router establishes Native IP connectivity to perform remote data migration operations. Use this command to add and remove remote peers.

Authority

miguser

Syntax

`remotepeer`

Keywords

`add`	Adds a remote router at a remote site.
`rm`	Replaces the remote router's management and iSCSI port information with its own information.

Examples

The following shows an example of the `remotepeer add` command.

```
MPX200 <1> (admin) (miguser)#> remotepeer add
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
PEER MGMT port address (IPv4 or IPv6)  [0.0.0.0]  172.35.14.85
Contacting PEER system (timeout=120 seconds) ...
<Admin> password of PEER system:   ******

<Admin> password confirmed.

Remote System Information
---------------------------------------------------
Product Name   DTA2800
Symbolic Name  Blade-1
Serial Number  0906E00039
No.of iSCSI Ports   2
iSCSI Base Name     iqn.1992-08.com.netapp:dta.0834e00029.b1
Mgmt IPv4 Address   172.35.14.85
iSCSI Port 1 IPv4 Address        40.40.40.40
iSCSI Port 1 IPv6 Link-Local     fe80::2c0:ddff:fe13:1734
iSCSI Port 2 IPv6 Link-Local     fe80::2c0:ddff:fe13:1735
Please select an ISCSI IP Address from REMOTE system above(IPv4 or IPv6)
[0.0.0.0     ] 40.40.40.40
iSCSI Port 1 IPv4 Address        40.40.40.61
iSCSI Port 1 IPv6 Link-Local     fe80::2c0:ddff:fe1e:f80a
iSCSI Port 2 IPv6 Link-Local     fe80::2c0:ddff:fe1e:f80b
Please select an ISCSI IP Address from LOCAL system above(IPv4 or IPv6)
[0.0.0.0     ] 40.40.40.61
Do you wish to add another ISCSI connection to the REMOTE system (y/n):  n
Connect to Remote System Blade-1(0906E00039) using connection(s):
0) 40.40.40.61(LOCAL) to 40.40.40.40(REMOTE)
Remote Peer usage [1=Data Migration, 2=RemoteMaps]        [Data Migration]
Do you wish to add the REMOTE system above (y/n):  y
RemoteAdd: Remote Call set the peer usage type to 1
All attribute values that have been changed will now be saved.
```

The following example shows the `remotepeer rm` command:

```
MPX200 <1> (admin) #> remotepeer rm
 Index    (Symbolic Name/Serial Number)
-------------------------------------------------------
 0       Blade-1(0906E00095)
Please select a remote system from the list above ('q' to quit):  0
All attribute values that have been changed will now be saved.
```

rescan devices

Rescan the devices for new LUNs.

Authority

admin

Syntax

`rescan devices`

Examples

The following shows an example of the `rescan devices` command.

```
MPX200 <1> (admin) #> rescan devices
Index State    (Symbolic Name, WWPN/WWNN,WWPN/iSCSI Name, Ip Address)
----- -----  ---------------------------------------------------
0     Online   HP HSV200-0, 50:00:1f:e1:50:0a:e1:49
1     Online   DGC RAID-2, 50:06:01:62:41:e0:49:2e
2     Online   HP HSV210-2, 50:00:1f:e1:50:0a:37:18
3     Online   NETAPP LUN-3, 50:0a:09:82:98:8c:a7:79
Please select a Array/Target from the list above ('q' to quit): 0
Successfully initiated rediscovery on selected targets.
```

reset

Restores the router configuration parameters to the factory default values.

The `reset factory` command deletes all LUN mappings, as well as all persistent data regarding targets, LUNs, initiators, virtual port group settings, log files, iSCSI and MGMT (management port) IP addresses, FC and Ethernet port statistics, and passwords. This command also restores the factory default IP addresses. Issue the reset factory command on either an individual blade or on the chassis. On the chassis, this command resets both the blades to their factory defaults.

The `reset mappings` command clears all information except the MGMT and iSCSI IP address.

Authority

admin

Syntax

`reset`

Keywords

`factory`	Deletes router configuration and reverts the settings to the factory defaults.
`mappings`	Deletes router mappings and resets them to factory defaults.

Examples

The following example shows the `reset factory` command:

```
MPX200 <1> (admin) #> reset factory
Are you sure you want to restore to factory default settings (y/n): y
Please reboot the System for the settings to take affect.
```

The following example shows the `reset factory` command on the chassis:

```
MPX200 <1> (admin) #> reset factory
This command will reset BOTH blades to there factory defaultsettings.  Both blades will be rebooted automatically.
 Are you sure you want to reset the chassis to factory defaults?  (y/n): y
```

The following example shows the `reset mappings` command:

```
MPX200 <1> (admin) #> reset mappings
Are you sure you want to reset the mappings in the system (y/n): y
Please reboot the System for the settings to take affect.
```

save capture

Captures the system log that you can use to detect and troubleshoot problems when the MPX200 is exhibiting erroneous behavior. This command generates a `System_Capture.tar.gz` file that provides a detailed analysis.

Authority

admin

Syntax

```
save capture
```

Examples

The following example shows the `save capture` command:

```
MPX200 <1> (admin) #> save capture
Debug capture completed. Package is System_Capture.tar.gz
Please use FTP to extract the file out from the System.
```

scrub_lun

Manages data scrubbing jobs, including scheduling, starting, stopping, pausing, resuming, and deleting jobs, as well as acknowledging completed jobs.

Authority

miguser

Syntax

```
scrub_lun
```

Keywords

`acknowledge`	Acknowledges the completed scrub job.
`add`	Creates a data scrubbing job to "scrub" (wipe out data from) the LUN using four scrubbing algorithms.
`pause`	Pauses the running scrub job.
`resume`	Resumes the paused scrub job.
`rm`	Deletes the scrub job.
`rm_peer`	Removes the scrub job from the peer blade when the owner blade is not up.
`start`	Starts a stopped scrub job.
`stop`	Stops the running scrub job.

Examples

The following example shows the `scrub_lun acknowledge` command:

```
MPX200 <1> (miguser) #> scrub_lun acknowledge
Job Type       Status                  Job Description
ID
--- ----       ----------------------- -------------------------------------
0   Scrubbi..   Completed                HP HSV200-0:VPG1:004
Please select a Job Id from the list above ('q' to quit): 0
All attribute values for that have been changed will now be saved.
```

The following example shows the `scrub_lun add` command:

```
MPX200 <1> (miguser) #> scrub_lun add
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index  WWPN, PortId/ iScsiName, Ip Add   Symbolic Name    Target Type
-----  -------------------------------- ------------------- ------------
0     :00:1f:e1:50:0a:e1:49, 8c-02-00    HP HSV200-0          Src+Dest
1     :06:01:62:41:e0:49:2e, 82-01-00    DGC RAID-2           Src+Dest
2     :00:1f:e1:50:0a:37:18, 82-04-00    HP HSV210-2          Src+Dest
3     0a:09:82:98:8c:a7:79, 61-13-00     NETAPP LUN-3         Src+Dest
Please select a Target from the list above ('q' to quit): 0
Index (VpGroup Name)
----- --------------
1      VPGROUP_1
Please select a VPGroup for Lun ('q' to quit): 1
LUN Vendor LUN Size( GB)  Attributes Serial Number/WWULN
--- ------ --------------  ---------- ------------------
1   HP     10.00          MAPPED     PB5A8C3AATK8BW
60:05:08:b4:00:07:59:a4:00:02:d0:00:00:8d:00:00
2  HP      10.00          SRC LUN    PB5A8C3AATK8BW
60:05:08:b4:00:07:59:a4:00:02:d0:00:00:90:00:00
3  HP      12.00                     PB5A8C3AATK8BW
60:05:08:b4:00:10:6b:ac:00:02:f0:00:00:b6:00:00
4  HP      10.00                     PB5A8C3AATK8BW
60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:59:00:00
5  HP      10.00                     PB5A8C3AATK8BW
60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5c:00:00
6  HP      10.00                    PB5A8C3AATK8BW
60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5f:00:00
7  HP      10.00                    PB5A8C3AATK8BW
60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:62:00:00
8  HP      10.00         PB5A8C3AATK8BW
60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:65:00:00
9  HP      100.00       DATA MGMT   PB5A8C3AATK8BW
60:05:08:b4:00:10:6b:ac:00:02:a0:00:00:af:00:00
10 HP      3.00                      PB5A8C3AATK8BW
60:05:08:b4:00:07:59:a4:00:02:e0:00:05:91:00:00
11 HP       4.00                     PB5A8C3AATK8BW
 60:05:08:b4:00:07:59:a4:00:02:e0:00:05:94:00:00
Please select a LUN ('q' to quit): 4
Please Enter a Job Description (Max = 64 characters)
default name [ HP HSV200-0:VPG1:004 ]
Index Group Owner    Group Name
----- -----------    ----------
0     1              Group 0
Please select a Group that this Job should belong to [0]
Index Scrubbing Algorithm
----- --------------------------------
0     ZeroClean            [ 2 Pass ]
1     DOD_5220_22_M        [ 4 Pass ]
2     DOD_5220_22_M_E      [ 4 Pass ]
3     DOD_5220_22_M_ECE    [ 8 Pass ]
Please select a Scrubbing Algorithm for this job [0] 2
Do you wish to continue with the operation(yes/no)? [No] yes
Start Time (1=Now, 2=Delayed, 3=JobSerialScheduling, 4=ConfigureOnly) [Now ]
Successfully created Job
All attribute values for that have been changed will now be saved.
```

The following example shows the `scrub_lun pause` command:

```
MPX200 <1> (miguser) #> scrub_lun pause
Job Type      Status                    Job Description
ID
--- ----      ------------------------ -------------------------------------
0   Scrubbi.. Running (Pass: 1 13%)    NETAPP LUN-3:VPG1:001
Please select a Job Id from the list above ('q' to quit): 0
All attribute values for that have been changed will now be saved.
```

The following example shows the `scrub_lun resume` command:

```
MPX200 <1> (miguser) #> scrub_lun resume
Job Type     Status                    Job Description
ID
--- ----    ------------------------ -------------------------------------
0   Scrubbi.. Paused (Pass: 1 13%)  NETAPP LUN-3:VPG1:001
Please select a Job Id from the list above ('q' to quit): 0
All attribute values for that have been changed will now be saved.
```

The following example shows the `scrub_lun rm` command:

```
MPX200 <1> (miguser) #> scrub_lun rm
Job   Type    Status                 Job Description
ID
---   ----     ---------------------- ----------------------------------
0     Scrubbi.. Running (Pass: 1 23%)    NETAPP LUN-3:VPG1:001
Please select a Job Id from the list above ('q' to quit): 0
Do you wish to continue with the operation(yes/no)? [No] yes
Job marked for removal. It will be removed after pending operations are
complete.
```

The following example shows the `scrub_lun rm_peer` command:

```
MPX200 <2> (miguser) #> scrub_lun rm_peer
Job Type     Status                    Job Description
ID
--- ----    ------------------------  ------------------------------------
0 Scrubbi.. Running (Pass: 1 34%)     NETAPP LUN-3:VPG1:001
Please select a Job Id from the list above ('q' to quit): 0
Do you wish to continue with the operation(yes/no)? [No] yes
All attribute values for that have been changed will now be saved.
```

The following example shows the `scrub_lun start` command:

```
MPX200 <1> (miguser) #> scrub_lun start
Job Type    Status                   Job Description
ID
--- ----   ------------------------ ------------------------------------
0 Scrubbi.. Stopped                  NETAPP LUN-3:VPG1:001
Please select a Job Id from the list above ('q' to quit): 0
Start Time for JobId 0:(1=Now, 2=Delayed, 3=JobSerialScheduling) [Now ]
All attribute values for that have been changed will now be saved.
```

The following example shows the `scrub_lun stop` command:

```
MPX200 <1> (miguser) #> scrub_lun stop
Job Type    Status                   Job Description
ID
--- ----    ------------------------ ------------------------------------
0 Scrubbi.. Running (Pass: 1 1%)     NETAPP LUN-3:VPG1:001
Please select a Job Id from the list above ('q' to quit): 0
Stopping the job. Job will be stopped after pending operations are complete.
```

set

Configures arrays, system notifications, FC ports, license keys, system operational mode, and VPGs.

Authority

admin or miguser

Syntax

`set`

Keywords

`array`	Sets the target type of an array to make it behave as either a source, a destination, or both. For more information, see "set array" (page 106).
`event_notification`	Sets the system notification on or off, and specifies the URL to notify. For more information, see "set event_notification" (page 109).
`fc`	Sets the port status and programmed connection status. For more information, see "set fc" (page 109).
`features`	Saves and activates the array's data migration license key. For more information, see "set features" (page 110).
`iscsi`	Sets iSCSI port parameters including IP address, window scaling, and bandwidth.

`system`	Sets system properties. For more information, see "set system" (page 111).
`vpgroups`	Enables or disables the VP groups, and specifies names to each VP group. For more information, see "set vpgroups" (page 112).

set array

Sets the target type of an array to make it behave as either a source, a destination, or both.

Authority

miguser

Syntax

```
set array
```

Examples

The following example shows the `set array` command:

```
MPX200 <1> (miguser) #> set array
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index WWPN, PortId/ iScsiName, Ip Add   Symbolic Name        Target Type
----- ------------------------------- ------------------- ------------
0     50:00:1f:e1:50:0a:e1:49, 8c-02-00 HP HSV200-0          Src+Dest
1     50:00:1f:e1:50:0a:37:18, 82-04-00 HP HSV210-2          Src+Dest
2     50:06:01:62:41:e0:49:2e, 82-01-00 DGC RAID-2           Src+Dest
3     iqn.2001-05.com., 30.30.30.2      EQLOGIC 100E-00-7    Src+Dest
4     iqn.2001-05.com., 30.30.30.2      EQLOGIC 100E-00-8    Src+Dest
5     50:0a:09:82:88:8c:a7:79, 61-12-00 NETAPP LUN-3         Unknown
Please select a Target Id from the list above ('q' to quit): 5
Symbolic Name (Max = 128 characters) [NETAPP LUN-3]
Target Type (1=SrcTarget, 2=DstTarget, 3=Src+Dest 4=None Target) [3 ]
Bandwidth for Migration (0=Array Bandwidth, 50-1600 MBps ) [0 ]
Maximum Concurrent I/Os (0=32, 1=64, 2=128, 3=256) [128 ]
Enable I/O Pacing (0=Enable, 1=Disable) [Disabled ]
Enable Load Balancing (0=Enable, 1=Disable) [Enabled ]
Do you want to apply Local Migration Array license (yes/no) [No ]
Do you want to apply Data Scrubbing Array License (yes/no) [No ]
LunInfo Display with (1=LunId, 2=WWULN, 3=Serial Number) [1 ]
All attribute values for that have been changed will now be saved.
```

The following example shows the `set array` command for an imported array. On an imported array, you can set these additional Native IP parameters:

- **Compression**: Enable this option to compress the outgoing I/O. A 'good' compression ratio can potentially reduce bandwidth utilization and yield higher throughputs. However, a 'bad' compression ratio can limit the I/O performance.

  Enable compression if:

  - You know that the underlying data is compressible.
  - The available WAN bandwidth is less than 600 Mbps.
  - The available WAN bandwidth is greater than 600 Mbps, unless you observe performance degradation.

Disable compression if:

- You know that the underlying data is not compressible.
- The available WAN bandwidth is greater than 600 Mbps, but you observe performance degradation.

You can determine the compression ratio on the router based on the output from the `show perf byte` command and the following calculation:

Compression ratio = 1 – (GbE port throughput / FC port throughput)

- A difference of greater than 25 MB between the throughput on the FibreChannel port and the throughput on the GbE port indicates a 'good' compression ratio.
- A zero or negligible difference between the throughput on FC port and the throughput on the GbE port indicates a 'bad' compression ratio.

- **Breakup IO**: Enable this option to leverage the Native IP-based write acceleration of the router. HP recommends that you enable breakup to achieve better I/O performance.

```
MPX200 <1> (miguser) #> set array
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index     WWPN, PortId/           Symbolic Name       Target Type
-----  ------------------------------  ------------------  -------------
0      50:05:07:68:02:20:13:47, 01-05-00  IBM 2145-0            Source
1      20:45:00:a0:b8:2a:3f:78, 78-04-00  IBM 1814-1            Source
2      50:0a:09:81:98:cd:63:f5, 78-03-00  NETAPP LUN-2          Unknown
3      50:05:07:68:02:40:13:04 [Imported] IBM 2145-0            Destination
Please select a Target Id from the list above ('q' to quit):  3
Symbolic Name (Max = 128 characters)                              [IBM 2145-0]
Target Type (1=SrcTarget, 2=DstTarget, 3=Src+Dest 4=None Target)  [2         ]
Enable Load Balancing (0=Enable, 1=Disable)                       [Enabled   ]
Do you want to apply Data Migration Array license (yes/no)       [No        ]
LunInfo Display with (1=LunId, 2=WWULN, 3=Serial Number)          [1         ]
Compression (0=Enable, 1=Disable)                                 [Disabled  ]
Breakup IO (0=Enable, 1=Disable)                                  [Enabled   ]  1

All attribute values for that have been changed will now be saved.
```

Follow these steps to change the array properties using the CLI. Note that all data migration operations are authorized only to the migration administrator session, miguser. For more information, see “Miguser session” (page 76).

To set array properties in the CLI:

1. Log into the MPX200 as guest and enter the password.
2. Open a miguser session using the following command:
   `miguser start -p migration (`
   The default password for miguser is *migration*.)
3. To access the array properties, enter the following command:
   `set array`
4. Select a target ID by entering its index number.
5. At the prompts, modify as needed the symbolic name, target type, array bandwidth, maximum concurrent I/Os, I/O pacing, and load balancing for the source and destination arrays.

NOTE: The MPX200 uses the Maximum Concurrent I/Os parameter to generate migration I/Os for the jobs configured on the array. Because the array may also be used by the hosts, migration I/Os from the MPX200 and host I/Os may result in I/Os that exceed the maximum concurrent I/Os supported by array.

Arrays are equipped to handle this scenario and start returning the SCSI status as `0x28(TASK SET FULL)` or`0x08(BUSY)` for the incoming I/Os that exceed the arrays' maximum concurrent I/O limit. The TASK SET FULL or BUSY SCSI status indicates congestion at the array controller. If the array is being used by hosts (different LUNs for offline migration or LUNs under migration for online migration), the increased concurrent I/Os have an adverse effect on the host I/O.

Thus, the MPX200 requires automated throttling while trying to maximize migration performance by increasing concurrent I/Os. To control automatic throttling and pacing of migration I/O, use the `Enable I/O Pacing` option. To achieve automated throttling, the MPX200 intelligently manages concurrent migration I/Os to maximize overall system throughput. If a `Queue Full` or `Busy` condition is detected, the MPX200 throttles the migration I/O until it finds the condition of `Queue Full` or `Busy` condition. After the condition is cleared, the MPX200 starts issuing more migration I/Os. This behavior maximizes host and migration I/O performance.

The DM CLI allows you to change the `Bandwidth for Migration`, `Maximum Concurrent I/Os`, and `Enable I/O Pacing` settings only if the Target Type is either *Source* or *Src+Dest Target*.

6. At the `Do you want to apply array license (yes/no)` prompt, enter `yes` (the default is `no`) to apply your changes.

The following shows an example of how to change the array properties in the CLI.

```
MPX200 <1> (miguser) #> set array
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index WWPN, PortId                        Symbolic Name     Target Type
0     20:78:00:c0:ff:d5:9a:05, 00-00-00   HP MSA2012fc-0    Src+Dest
1     50:00:1f:e1:50:0a:e1:49, 82-07-00   HP HSV200-1       Src+Dest
2     50:06:01:60:4b:a0:35:de, 82-03-00   DGC RAID-2        Src+Dest
3     50:00:1f:e1:50:0a:37:18, 00-00-00   HP HSV210-3       Src+Dest
Please select a Target Id from the list above ('q' to quit): 0
Symbolic Name (Max = 128 characters) [HP MSA2012fc-0]
Target Type (1=SrcTarget, 2=DstTarget, 3=Src+Dest 4=None Target) [3 ]
Bandwidth for Migration (0=Array Bandwidth, 50-1600 MBps ) [0 ]
Maximum Concurrent I/Os (0=32, 1=64, 2=128, 3=256) [128 ]
Enable I/O Pacing (0=Enable, 1=Disable) [Disabled ]
Enable Load Balancing (0=Enable, 1=Disable) [Enabled ]
Array based licensed applied.
All attribute values for that have been changed will now be saved.
```

If you have purchased array-based licenses and installed the licenses in the MPX200, follow these steps to license a specific array for data migration. For every array that is licensed, one license is consumed.

To apply an array-based license to a specific array in the CLI:

1. Open a miguser session using the following command: `miguser start -p migration`.
2. To apply a license, enter the following command:
   `set array`, see "set array" (page 106)
3. At the prompt, `Do you want to apply array license (yes/no)`, enter `yes`.

The following example shows the `set array` command.

```
MPX200 <1> (miguser) #> set array
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index WWPN, PortId                      Symbolic Name     Target Type
----- ------------------------------- ---------------  -----------
0     50:00:1f:e1:50:0a:e1:4c, 01-2b-00 HP HSV200-0       Unknown
1     50:00:1f:e1:50:0a:37:18, 01-24-00 HP HSV210-1       Unknown
2     50:06:01:69:41:e0:18:94, 01-2d-00 DGC RAID-2        Unknown
3     20:70:00:c0:ff:d5:9a:05, 01-0f-ef HP MSA2012fc-3    Unknown
Please select a Target Id from the list above ('q' to quit): 1
Symbolic Name (Max = 128 characters) [HP HSV210-1]
Target Type (1=SrcTarget, 2=DstTarget, 3=Src+Dest Target) [3 ] 1
Bandwidth for Migration (0=Array Bandwidth, 50-1600 MBps ) [0 ]
Do you want to apply array license (yes/no) [No ]yes
All attribute values for that have been changed will now be saved.
All attribute values for Port 2 that have been changed will now be saved.
```

set event_notification

Sets the system notification on or off, and specifies the URL to notify.

Authority

admin

Syntax

```
set event_notification
```

Examples

The following example shows the `set event notification` command:

```
MPX200 <2> (admin) #> set event_notification
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Notification (0=Enable, 1=Disable) [Disabled ] 0
Notification Method (1=HTTP) [HTTP ]
URL [ ]
http://172.35.14.183/put.php
All attribute values that have been changed will now be saved.
```

set fc

Sets the FC port status and programmed connection status.

Authority

admin

Syntax

```
set fc
```

Examples

The following example shows the `set fc` command:

```
MPX200 <1> (admin) #> set fc
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
```

```
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
WARNING:
The following command might cause a loss of connections to both ports.
Configuring FC Port: 1
-------------------------
Port Status (0=Enable, 1=Disable) [Enabled ]
Link Rate (0=Auto, 2=2Gb, 4=4Gb, 8=8GB) [Auto ]
Frame Size (0=512B, 1=1024B, 2=2048B) [2048 ]
Execution Throttle (Min=16, Max=65535) [256 ]
Programmed Connection Option:
(0=Loop Only, 1=P2P Only, 2=Loop Pref) [Loop Pref ]
All attribute values for Port 1 that have been changed will now be saved.
Configuring FC Port: 2
-------------------------
Port Status (0=Enable, 1=Disable) [Enabled ]
Link Rate (0=Auto, 2=2Gb, 4=4Gb, 8=8GB) [Auto ]
Frame Size (0=512B, 1=1024B, 2=2048B) [2048 ]
Execution Throttle (Min=16, Max=65535) [256 ]
Programmed Connection Option:
(0=Loop Only, 1=P2P Only, 2=Loop Pref) [Loop Pref ]
All attribute values for Port 2 that have been changed will now be saved.
```

set features

Saves and activates the array's data migration license key.

Authority

admin

Syntax

```
set features
```

Examples

The following example shows the `set features` command:

```
MPX200 <1> (admin) #> set features
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Enter feature key to be saved/activated: 2000800-LCWL13GAUWO5K-8-ARR-LIC
All attribute values that have been changed will now be saved.
```

The following example shows the `set features` command activating a time-based license key:

```
MPX200 <1> (admin) #> set features

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

Enter feature key to be saved/activated:
100600D0-LCAKJ11XK3PHW-AF75E533-DM-DS-TBL-12Months

All attribute values that have been changed will now be saved.
```

set iscsi

Sets the iSCSI port parameters, including the IP address, window scaling, and bandwidth.

Authority

admin

Syntax

`set iscsi [ <PORT_NUM>]`

Keywords

<PORT_NUM> The number of the iSCSI port to be configured.

Examples

The following example shows the `set iscsi` command:

```
MPX200 <1> (admin) #> set iscsi 1

A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list  press 'q' or 'Q' and the ENTER key
to do so.

WARNING:  The following command might cause a loss of connections to both ports.

Configuring iSCSI Port: 1
--------------------------
Port Status (0=Enable, 1=Disable)           [Enabled        ]
MTU Size (0=Normal, 1=Jumbo, 2=Other)       [Normal         ]
Window Size (Min=8192B, Max=16777216B)      [32768          ]
IPv4 Address                                [0.0.0.0        ] 172.35.10.10
IPv4 Subnet Mask                            [0.0.0.0        ] 255.255.255.0
IPv4 Gateway Address                        [0.0.0.0        ] 172.35.10.1
IPv4 TCP Port No. (Min=1024, Max=65535)     [3260           ]
IPv4 VLAN (0=Enable, 1=Disable)             [Disabled       ]
IPv6 Address 1                              [::             ]
IPv6 Address 2                              [::             ]
IPv6 Default Router                         [::             ]
IPv6 TCP Port No. (Min=1024, Max=65535)     [3260           ]
IPv6 VLAN (0=Enable, 1=Disable)             [Disabled       ]
iSCSI Header Digests (0=Enable, 1=Disable)  [Disabled       ]
iSCSI Data Digests (0=Enable, 1=Disable)    [Disabled       ]
Bandwidth, MB/sec (Min=1, Max=125)       [125       ]
All attribute values for Port 1 that have been changed will now be saved.
```

set system

Sets system properties.

Authority

admin

Syntax

`set system`

Examples

The following example shows the `set system` command:

```
MPX200 <1> (admin) #> set system
  A list of attributes with formatting and current values will follow.
  Enter a new value or simply press the ENTER key to accept the current value.
  If you wish to terminate this process before reaching the end of the list
  press 'q' or 'Q' and the ENTER key to do so.
  System Symbolic Name (Max = 64 characters)    [Blade-2   ]
  Target Presentation Mode (0=Auto, 1=Manual)    [Auto    ]
  Lun Mapping (0=Enable, 1=Disable)        [Enabled   ]
  Controller Lun AutoMap (0=Enable, 1=Disable)    [Disabled   ]
  Target Access Control (0=Enable, 1=Disable)    [Enabled   ]
  Telnet (0=Enable, 1=Disable)         [Enabled   ]
  SSH (0=Enable, 1=Disable)          [Enabled   ]
  FTP (0=Enable, 1=Disable)          [Enabled   ]
```

```
  System Log Level (Default,Min=0, Max=2)      [0     ]
  Time To Target Device Offline (Secs,Min=0, Max=120)[0      ]
All attribute values that have been changed will now be saved.
```

set vpgroups

Enables or disables the VP groups, and specifies a name to each VP group. Although VpGroup 1 cannot be disabled, you can change its name.

Authority

admin

Syntax

```
set vpgroups
```

Examples

The following shows an example of the `set vpgroups` command.

```
MPX200 <1> (admin) #> set vpgroups
The following wizard will query for attributes before persisting
and activating the updated mapping in the system configuration.
If you wish to terminate this wizard before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Configuring VpGroup: 1
-------------------------
VpGroup Name (Max = 64 characters)    [VPGROUP_1 ]   VPGroup 1
All attribute values for VpGroup 1 that have been changed will now be saved.
Configuring VpGroup: 2
-------------------------
Status (0=Enable, 1=Disable)       [Enabled ]
VpGroup Name (Max = 64 characters)    [VPGROUP_2 ]   VPGroup 2
All attribute values for VpGroup 2 that have been changed will now be saved.
Configuring VpGroup: 3
-------------------------
Status (0=Enable, 1=Disable)       [Enabled ]
VpGroup Name (Max = 64 characters)    [VPGROUP_3 ]   VPGroup 3
All attribute values for VpGroup 3 that have been changed will now be saved.
Configuring VpGroup: 4
-------------------------
Status (0=Enable, 1=Disable) [Enabled ]
VpGroup Name (Max = 64 characters)    [VPGROUP_4 ]   VPGroup 4
All attribute values for VpGroup 4 that have been changed will now be saved.
```

show array

Displays the status of array objects identified by the DMS.

Authority

guest

Syntax

```
show array
```

Examples

The following example illustrates the `show array` command:

```
MPX200 <1> #> show array

Array Information
-----------------
Symbolic Name     HP MSA2012fc-0
```

```
State              Online
Vendor ID          HP
Product ID         MSA2012fc
Target Type        Destination
Path Domain        FC
WWPN               20:78:00:c0:ff:d5:9a:05
Port ID            01-04-ef
State              Online
Path Domain        FC
WWPN               21:78:00:c0:ff:d5:9a:05
Port ID            01-06-ef
State              Online
Array Bandwidth    NA
Max I/Os           128
I/O Pacing         Enabled
Load Balancing     Enabled
Array License      Not Applied
LunInfo Display    Lun Id
Symbolic Name      IBM 1814-1
State              Online
Vendor ID          IBM
Product ID         1814 FAStT
Target Type        Source
Path Domain        FC
WWPN               20:15:00:a0:b8:2a:3f:78
Port ID            01-02-00
State              Online
Path Domain        FC
WWPN               20:24:00:a0:b8:2a:3f:78
Port ID            01-05-00
State              Online
Array Bandwidth    Available Bandwidth
Max I/Os           64
I/O Pacing         Enabled
Load Balancing     Enabled
Array License      Local Migration
LunInfo Display    Lun Id
```

The following example shows the `show array` command for an imported array:

```
MPX200 <1> (admin) (miguser) #> show array
Array Information
-----------------
Symbolic Name     NETAPP LUN-0
State             Online
Vendor ID         NETAPP
Product ID        LUN
Target Type       Unknown
Path Domain       FC
WWPN              50:0a:09:82:88:cd:63:f5
Port ID           61-0b-00
State             Online
Path Domain       FC
WWPN              50:0a:09:82:98:cd:63:f5
Port ID           8c-0f-00
State             Online
Array Bandwidth   Available Bandwidth
Max I/Os          0
I/O Pacing        Disabled
Load Balancing    Enabled
Array License     Data Migration
LunInfo Display   None
Symbolic Name     IBM 2145-1
State             Online
```

```
Vendor ID          IBM
Product ID         2145
Target Type        Unknown
Path Domain        FC
WWPN               50:05:07:68:02:40:13:46
Port ID            82-0c-00
State              Online
Path Domain        FC
WWPN               50:05:07:68:02:40:13:47
Port ID            8c-08-00
State              Online
Array Bandwidth    Available Bandwidth
Max I/Os           0
I/O Pacing         Disabled
Load Balancing     Enabled
Array License      Not Applied
LunInfo Display    None
Symbolic Name      DGC RAID-2
State              Online
Vendor ID          DGC
Product ID         RAID 5
Target Type        Unknown
Path Domain        FC
WWPN               50:06:01:62:41:e0:49:2e
Port ID            61-00-00
State              Online
Path Domain        FC
WWPN               50:06:01:6a:41:e0:49:2e
Port ID            61-02-00
State              Online
Array Bandwidth    Available Bandwidth
Max I/Os           0
I/O Pacing         Disabled
Load Balancing     Enabled
Array License      Data Migration
LunInfo Display    None
Symbolic Name      HP HSV210-1
State              Online
Vendor ID          HP
Product ID         HSV210
Target Type        Destination
Path Domain        FC [Imported]
WWPN               50:00:1f:e1:50:0a:37:1b
Import Path        20.20.20.89
State              Online
Path Domain        FC [Imported]
WWPN               50:00:1f:e1:50:0a:37:1d
Import Path        20.20.20.89
State              Online
Array Bandwidth    NA
Max I/Os           0
I/O Pacing         Disabled
Load Balancing     Enabled
Array License      Not Applied
LunInfo Display    None
```

show compare_luns

Summarizes the status of either all verify jobs or only jobs with a specific state. It also lists the configuration details of the selected job.

Authority

guest

Syntax

`show compare_luns`

Examples

The following shows an example of the `show compare_luns` command.

```
MPX200 <1> #> show compare_luns

Compare State Type ( 1=Running 2=Failed 3=Completed 4=Serial 5=All ) : 5

Index Id Creator Owner Type Status Job Description
----- -- ------- ------ ---- ------ ----------------------- ------------------------------
0 0 1 1 Compare Verify Running ( 2%) IBM 2145-0:VPG1:001 to 3PARda..

Please select a Compare Job Index from the list above ('q' to quit): 0

Compare Information
-------------------
Job Owner:Id:UUID b1:0:1105F00605b1716
Job Description IBM 2145-0:VPG1:001 to 3PARdata VV-1:VPG1:000
Group Name Group 0
Priority Not Applicable
Compare Status Verify Running
I/O Size 64 KB
Compare State 2% Complete
Compare Performance 102 MBps
Compare Curr Performance 102 MBps
Job ETC 0 hrs 1 min 37 sec
Start Time Fri Nov 2 14:13:59 2012
End Time ---
Delta Time ---
Source Array IBM 2145-0
Source Lun VPG:ID 1:1
Source Lun WWULN 60:05:07:68:02:80:80:a7:cc:00:00:00:00:00:13:5e
Source Serial Number 0200a02029f3XX00
Source Lun Size 10.000 GB
Source Lun Start Lba 0
Source Lun End Lba 20971519
Destination Array 3PARdata VV-1
Destination Lun VPG:ID 1:0
Destination Lun WWULN 50:00:2a:c0:00:02:1a:f8
Destination Serial Number 01406904
Destination Lun Size 10.000 GB
Destination Lun Start Lba 0
Destination Lun End Lba 20971519
Compared Data Size 20971520 Blocks (1 Block is of 512 bytes)
```

show dml

Lists all configured DMLs and shows DML-specific attributes such as LUN type (master, for example), LUN serial number, LUN state, data extents, and more. The first output line identifies the master blade.

Lists all configured DMLs and shows DML-specific attributes.

Authority

miguser

Syntax

`show dml`

Examples

The following example shows the `show dml` command:

```
MPX200 <1> (miguser) #> show dml
Current Master Blade Blade-2
Data Management           LUN Information
------------------------------
Symbolic Name             Data Mgmt Lun 0::1
```

```
Lun Type                    DRL [Master DML]
DML State                   Active
Owner Serial Number         0834E00021
Creator Blade Id            1
Array Symbolic Name         IBM 1814-0
Lun VPG:ID                  1:6
LUN WWULN                   60:0a:0b:80:00:2a:3f:78:00:00:67:e7:4c:fe:b4:22
LUN State                   Online
Free/Total Metadata         Extents 8192/8192
Free/Total Data Extents     49/49
```

show fc

Displays the port status, link status, port name, and node name for each FC port.

Authority

guest

Syntax

`show fc`

Examples

The following example shows the `show fc` command:

```
MPX200 <1> #> show fc
FC Port Information
---------------------
FC Port                     FC1
Port Status                 Enabled
Port Mode                   FCP
Link Status                 Up
Current Link Rate           8Gb
Programmed Link Rate        Auto
WWNN                        20:00:00:c0:dd:13:2c:60 (VPGROUP_1)
WWPN                        21:00:00:c0:dd:13:2c:60 (VPGROUP_1)
Port ID                     8c-0a-00 (VPGROUP_1)
WWNN                        20:01:00:c0:dd:13:2c:60 (VPGROUP_2)
WWPN                        21:01:00:c0:dd:13:2c:60 (VPGROUP_2)
Port ID                     8c-0a-01 (VPGROUP_2)
WWNN                        20:02:00:c0:dd:13:2c:60 (VPGROUP_3)
WWPN                        21:02:00:c0:dd:13:2c:60 (VPGROUP_3)
Port ID                     8c-0a-02 (VPGROUP_3)
WWNN                        20:03:00:c0:dd:13:2c:60 (VPGROUP_4)
WWPN                        21:03:00:c0:dd:13:2c:60 (VPGROUP_4)
Port ID                     8c-0a-04 (VPGROUP_4)
Firmware Revision No.       5.01.03
Frame Size                  2048
Execution Throttle          256
Connection Mode             Point-to-Point
SFP Type                    8Gb
FC Port                     FC2
Port Status                 Enabled
Port Mode                   FCP
Link Status                 Up
Current Link Rate           8Gb
Programmed Link Rate        Auto
WWNN                        20:00:00:c0:dd:13:2c:61 (VPGROUP_1)
WWPN                        21:00:00:c0:dd:13:2c:61 (VPGROUP_1)
Port ID                     8c-0d-00 (VPGROUP_1)
WWNN                        20:01:00:c0:dd:13:2c:61 (VPGROUP_2)
WWPN                        21:01:00:c0:dd:13:2c:61 (VPGROUP_2)
Port ID                     8c-0d-01 (VPGROUP_2)
WWNN                        20:02:00:c0:dd:13:2c:61 (VPGROUP_3)
WWPN                        21:02:00:c0:dd:13:2c:61 (VPGROUP_3)
Port                        ID 8c-0d-02 (VPGROUP_3)
WWNN                        20:03:00:c0:dd:13:2c:61 (VPGROUP_4)
WWPN                        21:03:00:c0:dd:13:2c:61 (VPGROUP_4)
Port ID                     8c-0d-04 (VPGROUP_4)
Firmware Revision No.       5.01.03
Frame Size                  2048
Execution Throttle          256
Connection Mode             Point-to-Point
SFP Type                    8Gb
```

show features

Lists available features and shows the current license status of each.

Authority

guest

Syntax

`show features`

Examples

The following example shows the `show features` command:

```
MPX200 <1> #> show features

License Information
-------------------
FCIP 1GbE Licensed
FCIP 10GbE Not Licensed
SmartWrite 1GbE Licensed
SmartWrite 10GbE Not Licensed
DM Capacity Licensed
DM Array Licensed
DS Capacity Licensed
DS Array Licensed
```

show feature_keys

Displays the feature key information.

Authority

guest

Syntax

`show feature_keys`

Examples

The following example shows the `show feature_keys` command:

```
MPX200 <2> #> show feature_keys

Feature Key Information
-----------------------
Key 400000-LC5I1SSJZBLI6-DM-10TB

Licensed Feature Data Migration 10TB

License Type Capacity Based

Chassis Licensed 1105F00605

Date Applied Sat Aug 6 19:25:09 2011

Key 100600D0-LCAKJ11XK3PHW-AF75E533-DM-DS-TBL-12Months

Licensed Feature Data Migration & Scrubbing

License Type Time Based

Chassis Licensed 1105F00605

Date Applied Fri Oct 26 09:50:51 2012
```

show initiators

Displays detailed information for all initiators.

Authority

guest

Syntax

```
show initiators
```

Examples

The following example shows the `show initiators` command.

```
MPX200 <2> #> show initiators

Initiator Information
----------------------
WWNN 50:06:01:60:cb:a0:35:de
WWPN 50:06:01:69:4b:a0:35:de
Port ID 64-09-00
Status Logged In
Type FC
OS Type Windows

WWNN 20:01:00:e0:8b:a8:86:02
WWPN 21:01:00:e0:8b:a8:86:02
Port ID 64-0f-00
Status Logged In
Type FC
OS Type Windows

WWNN 20:00:00:e0:8b:88:86:02
WWPN 21:00:00:e0:8b:88:86:02
Port ID 78-0b-00
Status Logged In
Type FC
OS Type Windows

WWNN 50:01:10:a0:00:17:60:67
WWPN 50:01:10:a0:00:17:60:66
Port ID 00-00-00
Status Logged Out
Type FC
OS Type Windows2012
```

show initiators_lunmask

Displays the masked LUNs for each initiator.

Authority

guest

Syntax

```
show initiators lun_mask
```

Examples

The following example shows the `show initiators_lunmask` command.

```
MPX200 <1> #> show initiators_lunmask
Index   Type   (WWNN,WWPN/iSCSI Name)
----- -----   ----------------------
```

```
0     FC      20:00:00:e0:8b:86:fb:9b,21:00:00:e0:8b:86:fb:9b
1     FC      20:00:00:e0:8b:89:17:03,21:00:00:e0:8b:89:17:03
2     ISCSI   iqn.1986-03.com.hp:fcgw.mpx200.dm.initiator
Please select an Initiator from the list above ('q' to quit): 0
Target(WWPN)                  (LUN/VpGroup)     MappedId      Serial Number/WWULN
------------                  -------------     --------       -------------------
50:00:1f:e1:50:0a:e1:48       3/VPGROUP_2       3              PB5A8C3AATK8BW

60:05:08:b4:00:10:6b:ac:00:02:d0:00:00:5f:00:00
```

show iscsi

Displays the iSCSI port settings, including status, name, and IP addresses for a specified port, or for all iSCSI ports known to the router if no port number is specified.

Authority

guest

Syntax

```
show iscsi
```

Examples

The following example shows the `show iscsi` command.

```
MPX200 <1> #> show iscsi
iSCSI Port Information
------------------------
iSCSI Port                  GE1
Port Status                 Enabled
Port Mode                   iSCSI
Link Status                 Up
iSCSI Name                  iqn.2004-08.com.qlogic:MPX200.0834e00021.b1
Firmware Revision           3.00.01.57
Current Port Speed          1Gb/FDX
Programmed Port Speed       Auto
MTU Size                    Normal
Window Size                 16777216
MAC Address                 00-c0-dd-13-16-6c
IPv4 Address                10.10.10.83
IPv4 Subnet Mask            255.255.255.0
IPv4 Gateway Address        0.0.0.0
IPv4 Target TCP Port No.    3260
IPv4 VLAN                   Disabled
IPv6 Address 1              ::
IPv6 Address 2              ::
IPv6 Link Local             fe80::2c0:ddff:fe13:166c
IPv6 Default Router         ::
IPv6 Target TCP Port No.    3260
IPv6 VLAN                   Disabled
iSCSI Max First Burst       65536
iSCSI Max Burst             262144
iSCSI Header Digests        Disabled
iSCSI Data Digests          Disabled
Bandwidth, MB/sec           125
```

show logs

Displays log BridgeApp event information.

Authority

guest

Syntax

```
show logs
```

Examples

The following example illustrates the `show logs` command used to display ten log records:

```
MPX200 <1> #> show logs 10
10/09/2011 11:11:04 BridgeApp 3 QLFC_Login: Port Name 500601604ba035de
10/09/2011 11:15:29 QLFC 3 #0: QLIsrEventHandler: RSCN update (8015)
rscnInfo:0x2080000 VpIndex:0x0
10/09/2011 11:15:29 QLFC 3 #0: QLIsrEventHandler: RSCN update (8015)
rscnInfo:0x2080000 VpIndex:0x1
10/09/2011 11:15:29 QLFC 3 #0: QLIsrEventHandler: RSCN update (8015)
rscnInfo:0x2080000 VpIndex:0x2
10/09/2011 11:15:29 QLFC 3 #0: QLIsrEventHandler: RSCN update (8015)
rscnInfo:0x2080000 VpIndex:0x3
10/09/2011 11:15:29 QLFC 3 #1: QLIsrEventHandler: RSCN update (8015)
rscnInfo:0x2080000 VpIndex:0x0
10/09/2011 11:15:29 QLFC 3 #1: QLIsrEventHandler: RSCN update (8015)
rscnInfo:0x2080000 VpIndex:0x1
10/09/2011 11:15:29 QLFC 3 #1: QLIsrEventHandler: RSCN update (8015)
rscnInfo:0x2080000 VpIndex:0x2
10/09/2011 11:15:29 QLFC 3 #1: QLIsrEventHandler: RSCN update (8015)
rscnInfo:0x2080000 VpIndex:0x3
10/09/2011 11:18:41 UserApp 3 ValidateSerialSchedule: Previous time 0 New
time 2
```

show luninfo

Displays the status of LUN objects identified by the DMS.

Authority

guest

NOTE: The `show luninfo` command displays all the LUNs that are seen by the MPX200 and their size and path information. To view a list of just all LUNs without the details, issue the `show luns` command instead.

Syntax

```
show luninfo
```

Examples

The following example shows the `show luninfo` command where multiple WWULNs are present:

```
MPX200 <1> #> show luninfo
Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0    20:04:00:a0:b8:2a:3f:78,20:15:00:a0:b8:2a:3f:78
1    20:04:00:a0:b8:2a:3f:78,20:24:00:a0:b8:2a:3f:78
2    20:78:00:c0:ff:d5:9a:05,20:78:00:c0:ff:d5:9a:05
3    20:78:00:c0:ff:d5:9a:05,21:78:00:c0:ff:d5:9a:05
Please select a Target from the list above ('q' to quit): 0
0    0/VPGROUP_1    1T70246204
          60:0a:0b:80:00:2a:3f:78:00:00:6c:49:4d:26:b5:38
1    1/VPGROUP_1    1T70246204
          60:0a:0b:80:00:2a:3f:d8:00:00:d1:c0:4d:91:36:23
2    2/VPGROUP_1    1T70246204
          60:0a:0b:80:00:2a:3f:d8:00:00:d1:c2:4d:91:36:44
3    3/VPGROUP_1    1T70246204
          60:0a:0b:80:00:2a:3f:d8:00:00:ad:86:4d:26:90:0a
4    4/VPGROUP_1    1T70246204
```

```
         60:0a:0b:80:00:2a:3f:d8:00:00:ad:88:4d:26:90:3a
5   5/VPGROUP_1   1T70246204
         60:0a:0b:80:00:2a:3f:78:00:00:6c:40:4d:26:b5:0c
Please select a LUN from the list above ('q' to quit): 0
LUN Information
-----------------
WWULN            60:0a:0b:80:00:2a:3f:78:00:00:6c:49:4d:26:b5:38
Serial Number    1T70246204
LUN Number       0
VendorId         IBM
ProductId        1814 FAStT
ProdRevLevel     0916
Portal           0
Lun Size         1024 MB
Lun State        Online
LUN Path Information
--------------------
Controller Id WWPN,PortId / IQN,IP Path          Status
------------- --------------------------------  -----------
  -          20:15:00:a0:b8:2a:3f:78, 01-02-00 Passive
  -          20:24:00:a0:b8:2a:3f:78, 01-05-00 Current
```

The following example shows the show `luninfo` command where multiple WWULNs are *not* present:

```
MPX200 <1> #> show luninfo
Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0     50:0a:09:80:85:95:82:2c,50:0a:09:81:85:95:82:2c
1     20:00:00:14:c3:3d:cf:88,21:00:00:14:c3:3d:cf:88
2     20:00:00:14:c3:3d:d3:25,21:00:00:14:c3:3d:d3:25
3     50:06:01:60:cb:a0:35:f6,50:06:01:68:4b:a0:35:f6
4     50:06:01:60:cb:a0:35:f6,50:06:01:60:4b:a0:35:f6
Please select a Target from the list above ('q' to quit): 3
Index (LUN/VpGroup)
----- -------------
0     0/VPGROUP_1
1     4/VPGROUP_1
2     5/VPGROUP_1
3     6/VPGROUP_1
4     7/VPGROUP_1
5     8/VPGROUP_1
6     9/VPGROUP_1
7     10/VPGROUP_1
8     11/VPGROUP_1
Please select a LUN from the list above ('q' to quit): 2
LUN Information
-----------------
WWULN          60:06:01:60:70:32:22:00:c7:02:f7:88:09:22:df:11
LUN Number     5
VendorId       DGC
ProductId      RAID 5
ProdRevLevel   0223
Portal         0
Lun Size       6144 MB
Lun State      Online
LUN Path Information
--------------------
Controller Id  WWPN,PortId / IQN,IP Path          Status
-------------  --------------------------------   -----------
     2           50:06:01:68:4b:a0:35:f6, 61-04-00 Current
```

show luns

Displays all the LUNs and their detailed information.

Authority

guest

Syntax

`show luns`

guest

Keywords

Examples

The following example shows the `show luns` command:

```
MPX200 <1> #> show luns
Target(WWPN)              VpGroup         LUN   Serial Number/WWULN
------------      -------         ---   -------------------
 20:15:00:a0:b8:2a:3f:78   VPGROUP_1       0     1T70246204
60:0a:0b:80:00:2a:3f:78:00:00:6c:49:4d:26:b5:38
                           VPGROUP_1      1     1T70246204
60:0a:0b:80:00:2a:3f:d8:00:00:d1:c0:4d:91:36:23
                           VPGROUP_1      2     1T70246204
60:0a:0b:80:00:2a:3f:d8:00:00:d1:c2:4d:91:36:44
                           VPGROUP_1      3     1T70246204
60:0a:0b:80:00:2a:3f:d8:00:00:ad:86:4d:26:90:0a
                           VPGROUP_1      4     1T70246204
60:0a:0b:80:00:2a:3f:d8:00:00:ad:88:4d:26:90:3a
          VPGROUP_1      5      1T70246204
60:0a:0b:80:00:2a:3f:78:00:00:6c:40:4d:26:b5:0c
 20:24:00:a0:b8:2a:3f:78  VPGROUP_1      0      1T70246204
60:0a:0b:80:00:2a:3f:78:00:00:6c:49:4d:26:b5:38
          VPGROUP_1      1    1T70246204
60:0a:0b:80:00:2a:3f:d8:00:00:d1:c0:4d:91:36:23
                           VPGROUP_1      2     1T70246204
60:0a:0b:80:00:2a:3f:d8:00:00:d1:c2:4d:91:36:44
                           VPGROUP_1      3     1T70246204
```

show memory

Displays the free and total memory.

Authority

guest

Syntax

`show memory`

Examples

The following examples show the `show memory` command:

```
MPX200 <1> #> show memory
Memory Units     Free/Total
--------------    ----------
Physical       198MB/1002MB
Buffer Pool     11392/12416
Nic Buffer Pool    40960/40960
```

```
Process Blocks   8192/8192
Request Blocks   8192/8192
Event Blocks    4096/4096
Control Blocks   1024/1024
Client Req Blocks  8192/8192
FCIP Buffer Pool   0/0
FCIP Request Blocks  0/0
FCIP NIC Buffer Pool 0/0
1K Buffer Pool   69623/69632
4K Buffer Pool   4096/4096
Sessions      4096/4096
Connections:
GE1       256/256
GE2       256/256
```

In the following example, 10GbE ports are present and show all the ports connected:

```
MPX200 <1> #> show memory
Memory Units    Free/Total
--------------   ----------
Physical      157MB/1002MB
Buffer Pool    7808/8832
Nic Buffer Pool   53344/65536
Process Blocks   8192/8192
Request Blocks   8192/8192
Event Blocks    4096/4096
Control Blocks   1024/1024
Client Req Blocks  8192/8192
FCIP Buffer Pool   0/0
FCIP Request Blocks  0/0
FCIP NIC Buffer Pool 0/0
1K Buffer Pool   69632/69632
4K Buffer Pool   4096/4096
Sessions      4095/4096
Connections:
GE1       255/256
GE2       256/256
10GE1       2048/2048
10GE2       2048/2048
```

show mgmt

Displays management port information, including the IP address, subnet mask, and gateway.

Authority

guest

Syntax

```
show mgmt
```

Examples

The following example shows the `show mgmt` command:

```
MPX200 <1> #> show mgmt
Management Port Information
----------------------------
IPv4 Interface   Enabled
IPv4 Mode     Static
IPv4 IP Address   172.35.14.53
IPv4 Subnet Mask   255.255.254.0
IPv4 Gateway    172.35.14.1
IPv6 Interface   Disabled
Link Status    Up
MAC Address    00-c0-dd-0d-a9-c1
```

show migration

Displays a summarized status of either all migration jobs or those having a specific state. It also lists the configuration details of the selected job.

Authority

guest

Syntax

`show migration`

Examples

The following example shows the `show migration` command for an offline data migration job:

```
MPX200 <2> #> show migration

Migration State Type ( 1=Running 2=Failed 3=Completed 4=Serial 5=All ) : 5

Index Id Creator Owner Type Status Job Description
----- -- ------- ------ ---- ------------------------ --------------------------------
0 0 1 1 Offline.. Running ( 10%) IBM 2145-0:VPG1:001 to 3PARda..

Please select a Migration Job Index from the list above ('q' to quit): 0

Migration Information
---------------------
Job Owner:Id:UUID b1:0:1105F00605b1714
Job Description IBM 2145-0:VPG1:001 to 3PARdata VV-1:VPG1:000
Group Name Group 0
Migration Type Offline (Local/Remote)
Verify Migration Data Yes
Priority Not Applicable
Migration Status Running
I/O Size 64 KB
Migration State 10% Complete
Migration Performance 204 MBps
Migration Curr Performance 204 MBps
Job ETC 0 hrs 1 min 35 sec
Start Time Fri Nov 2 14:00:24 2012
End Time ---
Delta Time ---
Source Array IBM 2145-0
Source Lun VPG:ID 1:1
Source Lun WWULN 60:05:07:68:02:80:80:a7:cc:00:00:00:00:00:13:5e
Source Serial Number 0200a02029f3XX00
Source Lun Size 10.000 GB
Source Lun Start Lba 0
Source Lun End Lba 20971519
Destination Array 3PARdata VV-1
Destination Lun VPG:ID 1:0
Destination Lun WWULN 50:00:2a:c0:00:02:1a:f8
Destination Serial Number 01406904
Destination Lun Size 10.000 GB
Destination Lun Start Lba 0
Destination Lun End Lba 20971519
Migration Size 20971520 Blocks (1 Block is of 512 bytes)
Destination LUN Not Thin Provisioned
```

The following example shows the `show migration` command for an online data migration job:

```
MPX200 <2> #> show migration

Migration State Type ( 1=Running 2=Failed 3=Completed 4=Serial 5=All ) : 5

Index Id Creator Owner Type Status Job Description
----- -- ------- ------ ---- ------------------------ --------------------------------
0 0 1 1 Online .. Running ( 10%) IBM 2145-0:VPG1:001 to 3PARda..

Please select a Migration Job Index from the list above ('q' to quit): 0

Migration Information
---------------------
Job Owner:Id:UUID b1:0:1105F00605b1715
Job Description IBM 2145-0:VPG1:001 to 3PARdata VV-1:VPG1:000
Group Name Group 0
Migration Type Online (Local)
```

```
Priority Not Applicable
Migration Status Running
I/O Size 64 KB
Migration State 10% Complete
Migration Performance 204 MBps
Migration Curr Performance 204 MBps
Job ETC 0 hrs 0 min 44 sec
Start Time Fri Nov 2 14:10:33 2012
End Time ---
Delta Time ---
Source Array IBM 2145-0
Source Lun VPG:ID 1:1
Source Lun WWULN 60:05:07:68:02:80:80:a7:cc:00:00:00:00:00:13:5e
Source Serial Number 0200a02029f3XX00
Source Lun Size 10.000 GB
Source Lun Start Lba 0
Source Lun End Lba 20971519
Destination Array 3PARdata VV-1
Destination Lun VPG:ID 1:0
Destination Lun WWULN 50:00:2a:c0:00:02:1a:f8
Destination Serial Number 01406904
Destination Lun Size 10.000 GB
Destination Lun Start Lba 0
Destination Lun End Lba 20971519
Migration Size 20971520 Blocks (1 Block is of 512 bytes)
Destination LUN Not Thin Provisioned
Number of DRL Blocks 0
```

show migration group

Displays the data migration group.

Authority

guest

Syntax

`show migration_group`

Example

The following example shows the `show migration_group` command:

```
MPX200 <1> #> show migration_group

Index Group Name
----- ----------
0 Group 0

Please select a Group ('q' to quit): 0

Index Id Creator Owner Type Status Job Description
----- -- ------- ------ ---- ----------------------- --------------------------------
0 0 1 1 Offline.. Verified (100%) IBM 2145-0:VPG1:001 to 3PARda..
1 1 1 1 Scrubbi.. Completed IBM 2145-0:VPG1:000

Please select a Migration Job Id from the list above : 0

Compare Information
-------------------
Job Owner:Id:UUID b1:0:1105F00605b1716
Job Description IBM 2145-0:VPG1:001 to 3PARdata VV-1:VPG1:000
Group Name Group 0
Priority Not Applicable
Compare Status Verified
I/O Size 64 KB
Compare State 100% Complete
Compare Performance 173 MBps
Start Time Fri Nov 2 14:13:59 2012
End Time Fri Nov 2 14:14:58 2012
Delta Time 59 Seconds
Source Array IBM 2145-0
Source Lun VPG:ID 1:1
Source Lun WWULN 60:05:07:68:02:80:80:a7:cc:00:00:00:00:00:13:5e
Source Serial Number 0200a02029f3XX00
Source Lun Size 10.000 GB
Source Lun Start Lba 0
```

```
Source Lun End Lba 20971519
Destination Array 3PARdata VV-1
Destination Lun VPG:ID 1:0
Destination Lun WWULN 50:00:2a:c0:00:02:1a:f8
Destination Serial Number 01406904
Destination Lun Size 10.000 GB
Destination Lun Start Lba 0
Destination Lun End Lba 20971519
Compared Data Size 20971520 Blocks (1 Block is of 512 bytes)
```

show migration_logs

Displays the data migration logs and the operation performed on them.

Authority

guest

Syntax

```
show migration_logs
```

Examples

The following example shows the `show migration_logs` command:

```
MPX200 <1> #> show migration_logs 6
Mon Jan 10 13:23:14 2011
Seq id: 448 : Job Type: Migration (Remote Online) : Destination LUN : Thin
Provisioned : Validate Destination LUN : Yes :miguser :ADDED : MigrOwner 1 :
Job UUID 0834E00029b173 : JobId 0(Online (Remote)) of group Group 0 with
priority 0 from Target DGC RAID-1 VpGroup 1 Lun
60:06:01:60:f9:31:22:00:01:b7:e7:2d:6e:1a:e0:11(1) Start Lba 0 to Target
NETAPP LUN-0 VpGroup 1 Lun NETAPP LUN C4i/aJaJ1e-V(1) Start Lba 0 with
migration size 1.00 GB (2097152 Blocks)
Mon Jan 10 13:23:15 2011
Seq id: 449 : Job Type: Migration (Remote Online) : Destination LUN : Thin
Provisioned : Validate Destination LUN : Yes :miguser :STARTING MIGRATION :
MigrOwner 1 : Job UUID 0834E00029b173 : JobId 0(Online (Remote)) of group Group
0 with priority 0 from Target DGC RAID-1 VpGroup 1 Lun
60:06:01:60:f9:31:22:00:01:b7:e7:2d:6e:1a:e0:11(1) to Target NETAPP LUN-0
VpGroup 1 Lun NETAPP LUN C4i/aJaJ1e-V(1) with migration size 1.00 GB (2097152
Blocks)
Mon Jan 10 13:23:38 2011
Seq id: 450 : Job Type: Migration (Remote Online) : Destination LUN : Thin
Provisioned : Validate Destination LUN : Yes :miguser :COMPLETED : MigrOwner 1
: Job UUID 0834E00029b173 : JobId 0(Online (Remote)) of group Group 0 with
priority 0 from Target DGC RAID-1 VpGroup 1 Lun
60:06:01:60:f9:31:22:00:01:b7:e7:2d:6e:1a:e0:11(1) to Target NETAPP LUN-0
VpGroup 1 Lun NETAPP LUN C4i/aJaJ1e-V(1) with migration size 1.00 GB (2097152
Blocks)
```

To view the data migration job log in the CLI:

1. Open a miguser session using the following command:
   `miguser start -p migration`
2. To view all logs related to all migration jobs, enter the following command:
   `show migration_logs`
3. To view only a limited number of log entries, specify a value; for example,
   `show migration_logs 5.`
4. To display *n* entries from offset *m*, which starts from the start of migration log file, enter the following command:
   `show migration_log n m`

For example:

```
MPX200 <1> #> show migration_logs 5 2
Mon Jan 12 06:42:43 2011
```

```
Seq id: 2 : Job Type: Migration (Online) : miguser :ADDED : MigrOwner 1 : JobId
0( Online) of group Group 0 with priority 0 from Target NETAPP LUN-0 Lun NETAPP
LUN hpTQaF01ICU6(0) StartLba 0 to Target NETAPP LUN-0 Lun NETAPP LUN
hpTQaF01ICtb(1) StartLba 0 with migration size 2.00 GB (4194304 Blocks)
Mon Jan 12 06:42:44 2011
Seq id: 3 : Job Type: Migration (Online) : miguser :STARTING MIGRATION :
MigrOwner 1 : JobId 0( Online) of group Group 0 with priority 0 from Target
NETAPP LUN-0 Lun NETAPP LUN hpTQaF01ICU6(0) StartLba 0 to Target NETAPP LUN-0
Lun NETAPP LUN hpTQaF01ICtb(1) StartLba 0 with migration size 2.00 GB (4194304
Blocks)
Mon Jan 12 06:43:22 2011
Seq id: 4 : Job Type: Migration (Online) : miguser :FAILED: Error: Read Error :
MigrOwner 1 : JobId 0( Online) of group Group 0 with priority 0 from Target
NETAPP LUN-0 Lun NETAPP LUN hpTQaF01ICU6(0) StartLba 0 to Target NETAPP LUN-0
Lun NETAPP LUN hpTQaF01ICtb(1) StartLba 0 with migration size 2.00 GB (4194304
Blocks)
Tue Jan 13 02:49:29 2011
Seq id: 5 : Job Type: Migration (Online) : miguser :REMOVED : MigrOwner 1 :
JobId 0( Online) of group Group 0 with priority 0 from Target NETAPP LUN-0 Lun
NETAPP LUN hpTQaF01ICU6(0) StartLba 0 to Target NETAPP LUN-0 Lun NETAPP LUN
hpTQaF01ICtb(1) StartLba 0 with migration size 2.00 GB (4194304 Blocks)
```

The following example shows how to view the data migration log in the CLI:

```
MPX200 <1> #> show migration_logs 5
Thu Sep 10 13:15:49 2011
Seq id: 645 : Job Type: Migration : miguser :COMPLETED : JobId 0(Offline) of
group Group 0 with priority 0 from Target HP HSV200-0 Lun
60:05:08:b4:00:07:59:a4:00:02:a0:00:00:7e:00:00(6) StartLba 0 to Target HP
HSV200-0 Lun 60:05:08:b4:00:07:59:a4:00:02:a0:00:00:83:00:00(7) StartLba 0
with migration size 5.00 GB (10485760 Blocks)
Thu Sep 10 13:33:16 2011
Seq id: 646 : Job Type: Migration : miguser :ACKNOWLEDGED : JobId 0(Offline) of
group Group 0 with priority 0 from Target HP HSV200-0 Lun
60:05:08:b4:00:07:59:a4:00:02:a0:00:00:7e:00:00(6) StartLba 0 to Target HP
HSV200-0 Lun 60:05:08:b4:00:07:59:a4:00:02:a0:00:00:83:00:00(7) StartLba 0
with migration size 5.00 GB (10485760 Blocks)
Thu Sep 10 13:38:37 2011
Seq id: 647 : Job Type: Migration : miguser :ADDED : JobId 0(Offline) of group
Group 0 with priority 0 from Target HP HSV200-0 Lun Invalid Wwuln(6) StartLba 0
to Target HP HSV200-0 Lun Invalid Wwuln(7) StartLba 0 with migration size 5.00
GB (10485760 Blocks)
Thu Sep 10 13:38:37 2011
Seq id: 648 : Job Type: Migration : miguser :STARTING MIGRATION : JobId
0(Offline) of group Group 0 with priority 0 from Target HP HSV200-0 Lun Invalid
Wwuln(6) StartLba 0 to Target HP HSV200-0 Lun Invalid Wwuln(7) StartLba 0 with
migration size 5.00 GB (10485760 Blocks)
Thu Sep 10 13:39:45 2011
Seq id: 649 : Job Type: Migration : miguser :COMPLETED : JobId 0(Offline) of
group Group 0 with priority 0 from Target HP HSV200-0 Lun Invalid Wwuln(6)
StartLba 0 to Target HP HSV200-0 Lun Invalid Wwuln(7) StartLba 0 with
migration size 5.00 GB (10485760 Blocks)
```

show migration_luninfo

Provides the current status and path information for any array LUN. Use this command to check the usability of a path in failover scenarios. The paths specified as passive are not used by data migration jobs if the current path fails. The passive path is capable only of reading the LUN size, vendor, and product information but cannot perform any I/O operation.

Authority

guest

Syntax

```
show migration_luninfo
```

Examples

The following example shows the `show migration_luninfo` command.

```
MPX200 <1> #> show migration_luninfo
Index WWPN, PortId/ iScsiName, Ip Add Symbolic Name Target Type
----- ------------------------------- ------------------- -------------
```

```
0 20:15:00:a0:b8:2a:3f:78, 01-02-00 IBM 1814-1 Source
1 20:78:00:c0:ff:d5:9a:05, 01-04-ef HP MSA2012fc-0 Destination
Please select a Target from the list above ('q' to quit): 0
Index (LUN/VpGroup) Serial Number/WWULN
----- ------------- ------------------
0     0/VPGROUP_1   1T70246204
                     60:0a:0b:80:00:2a:3f:78:00:00:6c:49:4d:26:b5:38
1     1/VPGROUP_1   1T70246204
                    60:0a:0b:80:00:2a:3f:d8:00:00:d1:c0:4d:91:36:23
2     2/VPGROUP_1   1T70246204
                    60:0a:0b:80:00:2a:3f:d8:00:00:d1:c2:4d:91:36:44
3     3/VPGROUP_1   1T70246204
                    60:0a:0b:80:00:2a:3f:d8:00:00:ad:86:4d:26:90:0a
4     4/VPGROUP_1   1T70246204
                    60:0a:0b:80:00:2a:3f:d8:00:00:ad:88:4d:26:90:3a
5     5/VPGROUP_1   1T70246204
                    60:0a:0b:80:00:2a:3f:78:00:00:6c:40:4d:26:b5:0c
Please select a LUN from the list above ('q' to quit): 0
LUN Information
-----------------
WWULN                 60:0a:0b:80:00:2a:3f:78:00:00:6c:49:4d:26:b5:38
Serial Number         1T70246204
LUN Number            0
VendorId              IBM
ProductId             1814       FAStT
ProdRevLevel          0916
Portal                0
Lun Size              1024 MB
Lun State             Online
LUN Path Information
--------------------
Controller Id WWPN, PortId/ IQN, IP Path            Status
------------- --------------------------------    -----------
-             20:15:00:a0:b8:2a:3f:78, 01-02-00     Passive
-             20:24:00:a0:b8:2a:3f:78, 01-05-00     Current
```

show migration_params

Displays the current system time and the start time for a serial scheduled job. The start time is set using the `start_serial_jobs` command; see "start_serial_jobs" (page 136).

Authority

guest

Syntax

```
show migration_params
```

Examples

The following example shows the `show migration_params` command:

```
MPX200 <1> #> show migration_params
  Current Time : Mon Dec 15 08:36:12 2011
  Serial Scheduled Start Time : Mon Dec 15 08:37:00 2011
```

show migration_perf

Displays the migration performance of a specified data migration job.

Authority

guest

Syntax

```
show migration_perf
```

Examples

The following example shows the `show migration_perf` command:

```
MPX200 <1> #> show migration_perf 0
Migration State Type ( 1=Running 2=Completed ) : 1
Index Id Creator Owner  Type        Status                Job Description
----- -- ------- ------ ---- ----------------------- -------------------------------------
0     2     1     1     Online .. Running ( 26%)       HP MSA2324fc-0:VPG1:005 to HP..
Please select a Migration Job Index from the list above ('q' to quit): 0
Retrieving Migration Job (Id: 2) IO Statistics... (Press any key to stop
display)
     Migration IO            Flush IO                  Host IO
                                                Read IOs          Write IOs
IOps     MBs        IOps          MBs         IOps    MBs        IOps     MBs
------   ------     ------        ------      ------  ------     ------   ------
3086     192        0             0           0       0          0        0
2900     181        0             0           0       0          0        0
2882     180        0             0           0       0          0        0
2807     175        0             0           0       0          0        0
2771     173        0             0           0       0          0        0
3075     192        0             0           0       0          0        0
698      43         0             0           0       0          0        0
0        0          0             0           0       0          0        0
0        0          0             0           0       0          0        0
0        0          0             0           0       0          0        0
```

show migration_usage

Displays licenses usage, information about array-based licenses, and details of the array that is licensed.

Authority

guest

Syntax

```
show migration_usage
```

Examples

The following example shows the `show migration_usage` command:

```
MPX200 <2> #> show migration_usage

Migration License Usage
-----------------------
Total capacity licensed 63050836.80 GB
Migration license consumed 63039722.14 GB
License consumed by active jobs 0.00 GB
Total capacity available 11114.67 GB

Data Scrubbing License Usage
----------------------------
Total Data Scrubbing licensed 9216.00 GB
Data Scrubbing license consumed 4238.00 GB
Data Scrubbing consumed by active jobs 0.00 GB
Total Data Scrubbing License available 4978.00 GB

Array Based Licenses
--------------------
Array based licenses issued 51
Array based licenses used 45
Available array based licenses 6

Data Scrubbing Array Based Licenses
-----------------------------------
```

```
Data Scrubbing Array based licenses issued 20
Data Scrubbing Array based licenses used 20
Available Data Scrubbing Array based licenses 0
```

show perf

Displays the performance (in bytes) of the active job.

Authority

guest

Syntax

```
show perf
```

Examples

The following examples show the `show perf` command:

```
MPX200 <1> #> show perf
WARNING: Valid data is only displayed for port(s) that are not
associated with any configured FCIP routes.
Port Bytes/s Bytes/s Bytes/s Bytes/s Bytes/s
Number (init_r) (init_w) (tgt_r)  (tgt_w)   (total)
------ -------- -------- -------- -------- --------
GE1     0        0        0        0        0
GE2     0        0        0        0        0
FC1     23M      0        0        0        23M
FC2     0        23M      0        0        23M
```

The following example shows 10GbE ports, where all of the ports are connected:

```
MPX200 <1> #> show perf
WARNING: Valid data is only displayed for port(s) that are not
associated with any configured FCIP routes.
Port Bytes/s Bytes/s Bytes/s Bytes/s Bytes/s
Number (init_r) (init_w) (tgt_r)   (tgt_w)   (total)
------ -------- -------- -------- -------- --------
GE1      0       0         0          0       0
GE2      0       0         0          0       0
10GE1    0       0         0          0       0
10GE2    0       0         0          0       0
FC1      0       0         0          0       0
FC2      0       0         0          0       0
```

show perf byte

Displays the active job performance in bytes.

Authority

guest

Syntax

```
show perf byte
```

Examples

The following examples illustrates the `show perf byte` command:

```
MPX200 <1> #> show perf byte
WARNING: Valid data is only displayed for port(s) that are not
         associated with any configured FCIP routes.
Displaying bytes/sec (total)... (Press any key to stop display)
```

```
GE1      GE2      FC1        FC2
---------------------------------
0        0       189M       189M
0        0       188M       188M
0        0       182M       182M
0        0       187M       187M
0        0       188M       188M
0        0       186M       186M
0        0       187M       187M
0        0       186M       186M
0        0       170M       170M
0        0       189M       189M
```

In the following example, 10GbE ports are present and shows all the ports connected:

In the following example, 10GbE ports are present and shows all the ports connected:

```
MPX200 <1> #> show perf byte
WARNING: Valid data is only displayed for port(s) that are not
         associated with any configured FCIP routes.
Displaying bytes/sec (total)... (Press any key to stop display)
GE1     GE2     10GE1     10GE2     FC1     FC2
-------------------------------------------------
0        0        0         0        0       0
0        0        0         0        0       0
0        0        0         0        0       0
0        0        0         0        0       0
0        0        0         0        0       0
0        0        0         0        0       0
0        0        0         0        0       0
```

show presented_targets

Displays all presented targets and their router virtual FC ports and iSCSI presented targets.

Authority

guest

Syntax

```
show presented_targets
```

Examples

The following example shows the `show presented_targets` command.

```
MPX200 <1> #> show presented_targets
Presented Target Information
----------------------------
FC/FCOE Presented Targets
---------------------
WWPN     21:04:00:c0:dd:13:2c:60
WWNN     20:04:00:c0:dd:13:2c:60
Port ID  82-0b-08
Port     FC1
<MAPS TO>
WWPN     50:00:1f:e1:50:0a:e1:48
WWNN     50:00:1f:e1:50:0a:e1:40
Port ID  82-0c-00
VPGroup  <GLOBAL>
WWPN     21:05:00:c0:dd:13:2c:60
WWNN     20:05:00:c0:dd:13:2c:60
Port ID  82-0b-0f
Port     FC1
<MAPS TO>
WWPN     50:06:01:62:41:e0:49:2e
WWNN     50:06:01:60:c1:e0:49:2e
Port ID  82-01-00
VPGroup   <GLOBAL>
iSCSI Presented Targets
-----------------------
Name     iqn.1986-03.com.hp:fcgw.mpx200.0851e00035.b1.01.50001fe1500ae148
<MAPS TO>
```

```
WWPN     50:00:1f:e1:50:0a:e1:48
WWNN     50:00:1f:e1:50:0a:e1:40
Port ID  82-0c-00
VPGroup 1
Name     iqn.1986-03.com.hp:fcgw.mpx200.0851e00035.b1.01.50001fe1500a3718
<MAPS TO>
WWPN     50:00:1f:e1:50:0a:37:18
WWNN     50:00:1f:e1:50:0a:37:10
Port ID  82-04-00
VPGroup  1
Name     iqn.1986-03.com.hp:fcgw.mpx200.0851e00035.b1.01.5006016241e0492e
<MAPS TO>
WWPN 50:06:01:62:41:e0:49:2e
WWNN 50:06:01:60:c1:e0:49:2e
Port ID 82-01-00
VPGroup 1
.
.
.
Name iqn.1986-03.com.hp:fcgw.mpx200.0851e00035.b1.02.50001fe1500a371c
<MAPS TO>
WWPN 50:00:1f:e1:50:0a:37:1c
WWNN 50:00:1f:e1:50:0a:37:10
Port ID 82-03-00
VPGroup 2
```

The following example shows the `show presented_targets` command for FC ports.

```
MPX200 <1> (admin) #> show presented_targets fc
Presented Target Information
-----------------------------
FC/FCOE Presented Targets
----------------------
WWPN     21:05:00:c0:dd:13:17:34
WWNN     20:05:00:c0:dd:13:17:34
Port ID  01-02-03
Port     FC1
<MAPS TO>
Name       iqn.1992-08.com.netapp:dta.0834e00029.b1 <Virtual>
```

show properties

Displays the CLI properties.

Authority

guest

Syntax

```
show properties
```

Examples

The following example shows the `show properties` command:

```
MPX200 <1> #> show properties
CLI Properties
----------------
Inactivty Timer         15 minutes
Prompt String           MPX200
```

show remotepeers

Displays detailed information about the remote router peer system, including the router IP address, iSCSI name, and status.

Authority

guest

Syntax

```
show remotepeers
```

Examples

The following example shows the `show remotepeers` command:

```
MPX200 <1> (admin) #> show remotepeers

Remote Peer System Information
------------------------------
Product Name                        MPX200
Symbolic Name                       Blade-1
Serial Number                       2800111111
No. of iSCSI Ports                  2
iSCSI Base Name                     iqn.1992-08.com.qlogic:isr.2800111109.b1
Mgmt IPv4 Address                   172.35.14.71
Mgmt IPv6 Link-Local                ::
Mgmt IPv6 Address 1                 ::
Mgmt IPv6 Address 2                 ::
No. of iSCSI Remote Connections     1
Remote iSCSI Connection Address     1      70.70.70.71  through  70.70.70.77
MPX200 <1> (admin) #> show remotepeers

Remote Peer System Information
------------------------------
Product Name                        DTA2800
Symbolic Name                       Blade-1
Serial Number                       0906E00039
No. of iSCSI Ports                  2
iSCSI Base Name                     iqn.1992-08.com.netapp:dta.0834e00029.b1
Mgmt IPv4 Address                   172.35.14.85
Mgmt IPv6 Link-Local                ::
Mgmt IPv6 Address 1                 ::
Mgmt IPv6 Address 2                 ::
No. of Remote IP Connections        1
Remote IP Connection Address        1      40.40.40.40  through  40.40.40.61
[Online  ]
Remote Peer Usage Type              Data Migration
```

show scrub_lun

Displays the scrub job details.

Authority

guest

Syntax

```
show scrub_lun
```

Examples

The following example shows the `show scrub_lun` command:

```
MPX200 <1> #> show scrub_lun

Scrubbing State Type ( 1=Running 2=Failed 3=Completed 4=Serial 5=All ) : 5

Index Id Creator Owner Type Status Job Description
----- -- ------- ------ ---- ------------------------ --------------------------------
0 1 1 1 Scrubbi.. Running (Pass: 1 17%) IBM 2145-0:VPG1:000
Please select a Scrubbing Job Index from the list above ('q' to quit): 0

Scrubbing Information
```

```
--------------------
Job Owner:Id:UUID b1:1:1105F00605b1717
Job Description IBM 2145-0:VPG1:000
Group Name Group 0
Scrubbing Type Scrubbing
Priority Not Applicable
Scrubbing Status Running
I/O Size 64 KB
Scrubbing Algorithm ZeroClean [ 2 Pass ]
Scrubbing CurrentPass 1
Scrubbing State 17% Complete
Scrubbing Performance 273 MBps
Scrubbing Curr Performance 273 MBps
Job ETC 0 hrs 1 min 56 sec
Start Time Fri Nov 2 14:15:36 2012
End Time ---
Delta Time ---
Array IBM 2145-0
Lun VPG:ID 1:0
Lun WWULN 60:05:07:68:02:80:80:a7:cc:00:00:00:00:00:14:ec
Source Serial Number 0200a02029f3XX00
Lun Size 11.000 GB
Start Lba 0
End Lba 23068671
Scrubbing Data Size 23068672 Blocks (1 Block is of 512 bytes)
```

show system

Displays system details.

Authority

guest

Syntax

`show system`

Examples

The following example shows the `show system` command.

```
MPX200 <1> #> show system
System Information
--------------------
Product Name                  MPX200
Symbolic Name                 Blade-1
Target Presentation Mode      Auto
Lun Mapping                   Enabled
Controller Lun AutoMap        Disabled
Target Access Control         Enabled
Time To Target Device Offline 0
Serial Number                 0851E0020
HW Version                    20694-03
SW Version                    3.3.0.0rc4l
Boot Loader Version           0.97.0.4
BIOS Version                  6.0.0.3
No. of FC Ports               2
No. of iSCSI Ports            2
Log Level                     0
Telnet                        Enabled
SSH                           Enabled
FTP                           Enabled
Temp (Front/Rear/CPU1/CPU2)   39C/26C/31C/31C
Uptime                        0Days0Hrs24Mins52Secs
```

show targets

Displays the WWPN and WWNN for all targets that are zoned in with the router ports. If one or more data LUNs are exposed to the router ports from the target, no information is shown.

Authority

guest

Syntax

```
show targets
```

Examples

The following example shows the `show targets` command:

```
MPX200 <1> #> show targets
Target Information
--------------------
WWNN                50:08:05:f3:00:1a:15:10
WWPN                50:08:05:f3:00:1a:15:11
Port ID             02-03-00
State               Online
WWNN                50:08:05:f3:00:1a:15:10
WWPN                50:08:05:f3:00:1a:15:19
Port ID             02-07-00
State               Online
```

The following example shows the `show targets` command with imported targets:

```
MPX200 <1> #> show targets
Target Information
--------------------
WWNN              50:05:07:68:02:00:13:47
WWPN              50:05:07:68:02:20:13:47
Port ID           01-05-00
State             Online
WWNN              50:05:07:68:02:00:13:46
WWPN              50:05:07:68:02:20:13:46
Port ID           78-00-00
State             Online
WWNN              20:04:00:a0:b8:2a:3f:78
WWPN              20:45:00:a0:b8:2a:3f:78
Port ID           78-04-00
State             Online
WWNN              50:0a:09:80:88:cd:63:f5
WWPN              50:0a:09:81:88:cd:63:f5
Port ID           78-0c-00
State             Online
WWPN              50:05:07:68:02:30:13:04  FC [Imported]
State             Online
IP Address        40.40.40.40 (Logged In --> GE1)
WWPN              50:05:07:68:02:40:13:05  FC [Imported]
State             Online
IP Address        40.40.40.40 (Logged In --> GE1)
```

show vpgroups

Lists the status and WWPN for each VP group.

The router's FC ports can present four virtual ports (if enabled) to zone with FC targets and allow the target to expose more LUNs to the router. The router provides the VP group by combining virtual port entities from each FC port. Every VP group includes one virtual port from each FC port. Because there are four virtual ports per FC port, there are four VP groups.

Authority

guest

Syntax

`show vpgroups`

Examples

The following example shows the `show vpgroups` command.

```
MPX200 <1> #> show vpgroups
VpGroup Information
---------------------
Index                1
VpGroup Name         VPGROUP_1
Status               Enabled
WWPNs                21:00:00:c0:dd:12:f4:f2
                     21:00:00:c0:dd:12:f4:f3
Index                2
VpGroup Name         VPGROUP_2
Status               Enabled
WWPNs                21:01:00:c0:dd:12:f4:f2
                     21:01:00:c0:dd:12:f4:f3
Index                VPGROUP_3
Status               Enabled
WWPNs                21:02:00:c0:dd:12:f4:f2
                     21:02:00:c0:dd:12:f4:f3
Index                4
VpGroup Name         VPGROUP_4
Status               Enabled
WWPNs                21:03:00:c0:dd:12:f4:f2
                     21:03:00:c0:dd:12:f4:f3
```

start_serial_jobs

Starts one or more serial scheduled jobs that have been configured but not yet started.

Authority

miguser

Syntax

`start_serial_jobs`

Examples

The following example shows the `start_serial_jobs` command:

```
MPX200 <1> (miguser) #> start_serial_jobs
Serial Job Start Time (1=Now, 2=Delayed) [Now ] 2
Please specify a Date & Time (in <MMddhhmmCCYY> format)
when the serial scheduled jobs should start. This should be
within the next 30 days. [ ] 121215002011
Started serial scheduled [migration | compare ] jobs
All attribute values for that have been changed will now be saved.
```

target rescan

Scans the target ports to see if one or more data LUNs are exposed to the router ports from the target. This command causes the router to create an array entity for the target ports through which the router is able to see data LUNs. The router deletes those ports from show targets output, see “show targets” (page 134).

Authority

admin

Syntax

`target`

Keywords

`rescan`

Examples

The following example shows the `target rescan` command:

```
mpx200 (admin) #> target rescan
Scanning Target WWPN 00:00:02:00:00:00:00:00
Target Rescan done
Scanning Target WWPN 00:00:03:00:00:00:00:00
Target Rescan done
Scanning Target WWPN 00:00:01:00:00:00:00:00
Target Rescan done
Scanning Target WWPN 50:08:05:f3:00:1a:15:11
Target Rescan done
Scanning Target WWPN 50:08:05:f3:00:1a:15:19
Target Rescan done
Target Re-Scan completed
```

To rescan targets in the CLI:

1. Open a miguser session using the following command:

   `miguser start -p config`

2. To rescan for target ports, enter the following command:

   `target rescan`

   For example:

   ```
   mpx200 (admin) #> target rescan
   Scanning Target WWPN 00:00:02:00:00:00:00:00
   Target Rescan done
   Scanning Target WWPN 00:00:01:00:00:00:00:00
   Target Rescan done
   Scanning Target WWPN 00:00:03:00:00:00:00:00
   Target Rescan done
   Scanning Target WWPN 50:08:05:f3:00:1a:15:11
   Target Rescan done
   Scanning Target WWPN 50:08:05:f3:00:1a:15:19
   Target Rescan done
   Target Re-Scan completed
   ```

targetmap

Presents or removes existing presentation of discovered FC and iSCSI targets on FC, iSCSI, and FC over Ethernet (FCoE) ports.

Authority

admin

Syntax

`targetmap`

Keywords

`add`	Adds the target presentation.
`rm`	Removes the target presentation.

Examples

The following example shows the `targetmap add` command using the automap option:

```
MPX200 <1> (admin) #> targetmap add
Index (WWNN,WWPN/iSCSI Name)
----- ----------------------
0   50:00:1f:e1:50:0a:e1:40,50:00:1f:e1:50:0a:e1:48
1   50:00:1f:e1:50:0a:e1:40,50:00:1f:e1:50:0a:e1:4c
2   50:00:1f:e1:50:0a:37:10,50:00:1f:e1:50:0a:37:18
3   50:00:1f:e1:50:0a:37:10,50:00:1f:e1:50:0a:37:1c
4   50:06:01:60:c1:e0:49:2e,50:06:01:62:41:e0:49:2e
5   50:06:01:60:c1:e0:49:2e,50:06:01:6a:41:e0:49:2e
6   50:0a:09:80:88:cd:63:f5,50:0a:09:81:88:cd:63:f5
7   50:0a:09:80:88:cd:63:f5,50:0a:09:81:98:cd:63:f5
Please select a target from the list above ('q' to quit): 6
Index (VpGroup Name)
----- --------------
0   GLOBAL
1   VPGROUP_1
2   VPGROUP_2
3   VPGROUP_3
4   VPGROUP_4
Please select a VpGroup from the list above ('q' to quit): 0
Index (IP/WWNN) (MAC/WWPN) (Portal)
----- ----------- ------------ --------
0   20:00:00:c0:dd:13:2c:60 21:00:00:c0:dd:13:2c:60 FC1
1   20:00:00:c0:dd:13:2c:61 21:00:00:c0:dd:13:2c:61 FC2
Please select a portal from the list above ('q' to quit): 0
Do you want to automap the selected target (Yes/No) [Yes ]
All attribute values that have been changed will now be saved.
```

The following example shows the `targetmap rm` command:

```
MPX200 <1> (admin) #> targetmap rm
Warning: This command will cause the removal of all mappings and hosts
will loose access to disks.
Index State VpGroup  Port (WWNN,WWPN/iSCSI Name)
----- ----- ------  ---- ----------------------
0   Online 1   FC1  20:06:00:c0:dd:13:2c:c4,21:06:00:c0:dd:13:2c:c4
1   Online 1   FC1  20:04:00:c0:dd:13:2c:c4,21:04:00:c0:dd:13:2c:c4
2   Online 1   FC1  20:05:00:c0:dd:13:2c:c4,21:05:00:c0:dd:13:2c:c4
Please select a target from the list above ('q' to quit): 0
All attribute values that have been changed will now be saved.
```

7 Performance and best practices

This chapter discusses the factors affecting data migration solution performance and offers suggestions for obtaining maximum performance.

Performance factors

DMS provides maximum throughput of 4 TB per hour. The migration performance depends upon several factors, including:

- Number of concurrent migration jobs running on the MPX200
- I/O size used for data transfer
- I/O traffic serviced by the array for other applications active during data migration
- FC link speed
- RAID configuration of LUNs
- Amount of host I/O on the LUN

Maximizing performance

Suggestions for maximizing performance include the following:

- Use Serial Scheduling of migration jobs, see "Using the data migration wizard" (page 55) instead of simultaneously starting all jobs.
- The MPX200 is capable of simultaneously configuring a maximum of 256 jobs on each blade. However, HP recommends that you simultaneously run only four to six jobs. The remaining jobs can be scheduled using Serial Scheduling or Delayed Scheduling.
- LUNs belonging to different RAID groups (sets of physical drives) or on a different array controller on the storage array should be scheduled to run simultaneously. To improve write performance, disable write cache settings on the destination array.
- To complete data migration jobs faster, run the migration job during off-peak load hours. For online jobs, the source and destination LUNs are synchronized until the migration job is acknowledged.

Optimal configuration and zoning

To get the best performance from the router, configure your system as follows:

- In the physical topology, configure switches with two ports each from the router, source array, and destination array.
- Set the zoning such that each router port sees both controller ports from the source array and the destination array.
- Balance the LUNs on the source and destination arrays between the two controller ports.

NOTE: HP recommends that you do not simultaneously run more than four to six data migration jobs per blade.

Expected time of completion (ETC) for data migration jobs

Overview

The MPX200 can help determine expected time of completion of a job currently in the Run State or the Completed state if it is configured for online migration. This feature is applicable to all types of jobs: online and offline, local and remote, as well as LUN compare jobs. The value is displayed

as hh:mm:ss and is an estimate based on the current I/O performance in 30 second intervals. Job ETC is displayed with job details either through CLI or the GUI.

CLI Example:

```
.
.
.
Migration Status           Running
I/O Size                   64 KB
Migration State            42% Complete
Migration Performance      17 MBps
Migration Curr Performance 25 MBps
Job ETC                    0 hrs 1 min 54 sec
.
.
.
```

GUI Example:

Operational Behavior

The ETC is calculated every 30 seconds by dividing the total blocks outstanding (to be copied, flushed, compared or scrubbed) by the job's current performance (MBps).

NOTE: Because the performance of a job depends on numerous external factors, ETC values may dynamically change during the job's execution.

Offline ETC job

- If an offline job is Running, ETC is the total outstanding blocks that are yet be copied from source to destination, divided by the job's current performance (MBps):

  Outstanding blocks / current performance MBps = ETC

- If an offline job is running with the `Verify` option, ETC is the total remaining blocks that are yet to be copied plus the size or the source LUN, divided by the job's current performance (MBps):

  Outstanding blocks + source LUN size / current performance MBps = ETC

- If an offline job is in `Verify` state, ETC is the total outstanding blocks that are yet to be verified from source to destination, divided by the job's current performance (MBps):

  Outstanding blocks / current performance MBps = ETC

- If an offline scrubbing job is running, ETC is the number of passes left times the size of the source LUN plus the number of blocks left for the current pass, divided by the job's current performance (MBps):

  (Number of passes left x size of source LUN) + number of blocks left for the current pass / current performance MBps = ETC

Online ETC job

- If an online (local/remote) job is running while the host is writing to the source LUN, ETC is the total outstanding blocks that are yet be copied from source to destination plus any outstanding Dirty Region Log (DRL) blocks, divided by the job's current performance (MBps):

  Outstanding blocks + DRL blocks / Current performance MBps = ETC

Behavior characteristics

- ETC is calculated every time the job is queried.
- If current performance is 0, the ETC is displayed as `---`
- If an online job is completed and there are no flush I/Os going on, the ETC is displayed as `---` and current performance is 0.
- Within the first 30 seconds after a job completes the current performance displays a value, but the ETC for the job is 0.
- If an online job is in `Copy Complete` state, but DRLs are being flushed, both current performance and values of ETC are displayed.
- For failed, paused, suspended, and stopped jobs, the ETC is displayed as `---` and current performance is 0.

Best practices

This section provides some best practice recommendations for DMS usage.

When to use offline data migration

For most non mission-critical applications, MPX200 provides effective offline data migration. You can configure data migration jobs in MPX200 while applications and servers remain online. Each MPX200 blade can support up to 4 TB per hour (typical midrange storage arrays can sustain between 2 to 3TB per hour).

Offline migration is more effective than online migration under the following conditions:

- If the server has less than 1 TB of data to migrate, the overall down time is comparable between online and offline migration. However, offline migration takes less setup time and provides a simpler migration process.
- If you have a large number of small LUNs on the same server, use offline migration.
- If you have applications with large amount of data (more than 2 TB) and can tolerate reasonable down time, use offline migration.

High availability and redundant configurations

The following recommendations pertain to HA and redundant configurations:

- The MPX200 is capable of detecting and performing load balancing over multiple paths. To achieve the highest data migration rates, zone multiple ports from each array controller with each port of the MPX200.
- To maximize performance, zone each MPX200 FC port with one or two ports from one of the array controllers.
- To optimize performance, HP recommends that LUNs under migration are balanced across two controllers of a storage array.

Choosing the right DMS options

Follow these guidelines when choosing DMS options:

- Use the Configure Only option to configure migration jobs while applications are still online. Start the migration jobs as soon as the server offline notification is received from the system administrator.
- To get optimum MPX200 performance, schedule a maximum of eight jobs to run simultaneously.
- To sequentially run migration jobs, use the Serial Scheduling feature, which allows the migration jobs to start automatically after the jobs with previous priority values are completed; no user intervention is required. Serial scheduling helps ensure optimum bandwidth usage without filling up array I/O queues, which may occur if jobs run simultaneously. Serial scheduling works best when migrating multiple jobs of similar size.
- Use the array bandwidth feature when applications are still using different LUNs of the array while DMS is migrating the data. This ensures that the MPX200 uses limited array bandwidth for the data migration and does not impact application performance during data migration.

General precautions

During any data migration, do not present the destination LUN to any host before the migration job is complete. To cross-validate and verify at the host that the data has been copied correctly, ensure that the destination LUN is presented to the host only after the verify job is completed at the router.
During *offline* data migration, ensure that hosts connected to source and destination LUNs are either zoned out completely, or that LUN masking is changed appropriately such that the LUNs being migrated are not accessible by any host other than the MPX200 until the migration is complete.
During *offline* data migration, ensure that the source LUN is not accessible to any host. Make the source LUN available only to the router.
Before running an *offline* data migration job, ensure that the host is shut down.
During *online* data migration, the host I/Os are routed through the router paths. For HP-UX hosts, ensure that the initiator type is set to HP-UX. In HP mpx Manager, in the left pane under the Discovered FC Initiators node, select an initiator, and then in the Information window in the right pane, click **HPUX** in the **OS Type Selection** box. Or, in the CLI, issue the `initiator mod` command, select the initiator, and then select the `OS Type of HP-UX`.
During *online* data migration, make the source LUN available to the host only through the router paths. Before acknowledging online migration jobs, ensure that the host is shut down and remove the LUN mapping through the router.
In HA configurations where the LUNs are visible from both MPX200 ports, ensure that both ports from each MPX200 blade are configured under a single host or host group entity of the type Windows/Windows 2003 in the array management software. This configuration ensures that all MPX200 ports from the same VP group see the same set of LUNs as having the same LUN ID. Failing to follow this configuration can lead to unpredictable or erroneous behavior. For a dual-blade configuration for the MPX200, add the same VP group WWPNs from both blades as one host entry. If you need to migrate more than 255 LUNs, you may create additional host entries in the array using WWPNs from additional VP groups in the MPX200.
Migration logs require the following handling: • Always clear migration logs at the start of the project. • Export migration logs onto your system after the project completes. • Migration logs wrap after 6,144 migration log entries.
If the source array controllers are configured in redundant fabrics, configure one MPX200 port into Fabric A and the second port into Fabric B.
When using the serial scheduling feature, configure similar size jobs with the same priority.

Array reconfiguration precautions include the following:

- If the LUN presentation from the array to the MPX200 is changed, click the Refresh button two or three times to see the changes.
- Wait for a few seconds between retries because the MPX200 will be running the discovery process.

Remove unused arrays for the following reasons:

- DMS allows a maximum of seven arrays to be configured at any time.
- Arrays stored in persistence consume resources even if the array is offline and no longer needed.
- After the migration is complete, HP recommends that you remove the arrays.
- If the array-based license was used and the array will not be used in the next project, remove the license for this array.

Array-based license use requires the following precautions:

- If you reconfigure a removed array, it may require a new array-based license.
- Use a maximum of 32 array-based licenses at any time.
- Use an array-based license if you require an ongoing replications of LUNs for the array.

8 Using the HP MSA2012fc storage array

MSA2012fc Array Behavior

The controllers A and B of the MSA2012fc expose a completely independent set of LUNs that cannot be accessed through other controllers. ControllerA-port0 and ControllerA-port1 form one array, and ControllerB-port0 and ControllerB-port1 form another array. The MSA2012fc array appears as two independent arrays on the MPX200.

Zoning: After data LUNs are assigned to the MPX200 ports, zone MPX200 ports (FC1 and FC2) with MSA2012fc (ControllerA-port0 and ControllerA-port1). This zoning creates an array entity that allows you to migrate data to and from LUNs owned by ControllerA. You must zone in ControllerB-port0 and ControllerB-port1 to be able to migrate data to and from LUNs owned by ControllerB. By doing so, you create a separate array entity for the ports belonging to ControllerB. To understand the physical connections required, refer to the MSA documentation on Fibre Channel port interconnect mode settings.

Using Array-based Licenses for MSA2012fc Array

As indicated in the preceding, each controller of the MSA2012fc array presents different LUNs to the MPX200 ports and hence appears as two separate arrays.

Using array-based licenses to migrate LUNs owned by both controllers requires two array licenses. If, however, all LUNs requiring migration are owned by a single controller, one array license should suffice.

MSA2012fc allows a maximum of 128 volumes (LUNs) to be accessed through one controller from any host. If you need to migrate data to and from more than 128 LUNs, you must present LUNs in batches with a maximum of 128 LUNs at a time.

To unpresent old LUNs and present new LUNs to the MPX200 ports, follow the steps in "Reconfiguring LUNs on a storage array" (page 146).

Workaround for Using a Single Array License for MSA2012fc

To use a single license for an MSA2012fc array where data needs to be migrated to and from LUNs owned by both ControllerA and ControllerB, use the following workaround:

1. Add array-based licenses (a Single Array or Three Array License) as required.
2. Present LUNs that need to be used by data migration jobs from the storage array to the MPX200 ports.
3. Make sure that the LUNs are presented with the same LUN ID for both MPX200 ports.
4. Zone in only ControllerA ports with the MPX200. The MPX200 creates one array entity for the zoned in ports, because they belong to the same controller.
5. Apply array-based licenses to the array entity using the set array CLI command, or in the License Array dialog box.
6. Configure data migration jobs as described in "Scheduling an individual data migration job" (page 56) or "Scheduling data migration jobs in batch mode" (page 58).
7. After the data migration jobs for all the LUNs belonging to ControllerA are completed and acknowledged, perform a `reconfiguration`.
8. Zone out the MSA2012fc ports and the MPX200 ports.
9. Unpresent the LUNs presented in Step 2.
10. Change the ownership of LUNs from ControllerB to ControllerA for all the LUNs that belong to Controller B and need to be used in data migration jobs.
11. Present LUNs from Step 10 from the storage array to the MPX200 ports.
12. Make sure that the LUNs are presented with the same LUN ID for both MPX200 ports.
13. Rezone the MSA2012fc ports and the MPX200 ports that were zoned out in Step 8.

14. Reboot the MPX200.

    The MPX200 can now see the new set of LUNs under the array entity that was licensed in Step 5.

15. Configure data migration jobs as described in "Scheduling an individual data migration job" (page 56) or "Scheduling data migration jobs in batch mode" (page 58).

9 Restrictions

This chapter details the restrictions that apply to DMS related to reconfiguring LUNs on a storage array, and removing an array after a data migration job completion.

Reconfiguring LUNs on a storage array

Carefully handle reconfiguration of a LUN ID following these guidelines:

- Do not change the LUN ID for any LUN that is currently configured to a data migration job or masked to an initiator.
- Before reassigning a LUN ID to a LUN, ensure that the LUN is not configured. If the LUN is configured, remove the configuration as follows:
  - If the LUN is configured to a migration job, remove or acknowledge the job.
  - If the LUN is masked to an initiator, remove the LUN mask.
- If a data migration job is completed, acknowledge the job prior to changing the LUN ID. If a data migration job has stopped on a specific LUN, remove the migration job before reassigning the LUN ID.
- After changing the LUN presentation from the array to the MPX200 (where either a different LUN is presented to the same LUN ID, or the same LUN is presented to a different LUN ID), click Refresh in HP StorageWorks mpx Manager and verify that the state of the LUN is online. Also, make sure that the correct LUN, WWULN and path information are shown.
- Before you reassign a LUN from one VP group to another VP group, you must remove that LUN from any LUN masking or data migration job configuration. This step is especially important if a different LUN with the same LUN ID is configured in the original VP group.

  For example, both LUN A and LUN B have LUN ID 8 and are configured in VPG1. If LUN A already has LUN masking or data migration jobs configured, remove all LUN masking and data migration jobs that include LUN A before reconfiguring LUN A to another VP Group (VPG2, VPG3, VPG4). If LUN A does not have any LUN masking or data migration jobs configured, it is not necessary to remove LUN masking or data migration jobs. QLogic recommends that you rescan storage arrays after reconfiguring VP groups.
- Specific arrays, such as the IBM DMX or Symmetrix VMAX, require that you set the SPC-2 bit prior to masking LUNs to the MPX200. Setting the SPC-2 bit ensures proper functioning of the MPX200, compliant behavior from the array side, and a change to the WWULN that is presented to the host from the array. Changing the bit setting after performing LUN masking may cause reconfiguration issues and prevent the MPX200 from showing the LUNs.

  To set the SPC-2 bit, first remove the zone that includes the MPX200 and array ports. Then issue the `array rm` command to remove the array entity created on the MPX200.

Removing an array after completing data migration jobs

After you complete all data migration jobs, remove the storage array by following the procedure in this section.

To remove an array after completing data migration jobs:

1. On the MPX200, remove the configuration from the LUNs associated with the array being removed:
   - If the LUN is configured to a migration job, remove or acknowledge the job.
   - If the LUN is masked to an initiator, remove the LUN mask.

2. On the switch, remove the configured zones containing MPX200 FC ports and controller ports of the array.
3. Wait for up to 30 seconds to see the array in the offline state in the `show array` command output, see "show array" (page 112).
4. If working on a dual-blade setup, repeat the preceding steps for the peer blade. The array must be offline on both blades before you can remove it.
5. Remove the array using the `array rm` command, see "array" (page 77).

NOTE: Firmware versions 3.2.x and later support both online and offline data migration, whereas firmware version 3.1.x supports only offline data migration. Migration jobs scheduled using firmware version 3.2.x and later may get "lost" in firmware 3.1.x, and may require you to configure them again.

After LUN reconfiguration, you must rescan the array either by right-clicking the appropriate array in mpx Manager and then selecting the **Rescan** option, or by issuing the `rescan devices` command in the CLI.

Serial scheduling jobs from multiple arrays

If you are using serial scheduling of migration jobs involving multiple arrays, HP recommends that you schedule serial jobs for SRC-1 on Blade 1 and SRC-2 on Blade 2. If more than two arrays exist, or if only a single blade is available for serial scheduling jobs from multiple arrays, assign different priorities to jobs from each array. This method prevents serial scheduling from starting the next priority job if one array goes offline.

10 Support and other resources

Contacting HP

For worldwide technical support information, see the HP support website:

http://www.hp.com/support

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

New and changed information in this edition

The following additions and changes have been made for this edition:

- The following information has been updated:
  - Unpacking and inspecting the server
  - Installing additional components
- A new Support and Other Resources chapter has been added.
- The Preface was removed

Related information

The following documents [and websites] provide related information:

- [example] *Data Migration Service for MPX200 Planning Guide*
- [example] *MPX200 Quick Start Guide*
- *MPX200 Router Manager User's Guide*
- *MPX200 Command Line Interface (CLI) User's Guide*

You can find these documents on the Manuals page of the HP Business Support Center website:

http://www.hp.com/support/manuals

In the Storage section, click **link label** and then select your product.

Websites

- HP Event Monitoring Service and HA Monitors Software http://www.hp.com/go/hpux-ha-monitoring-docs
- HP Serviceguard Solutions for HP-UX http://www.hp.com/go/hpux-serviceguard-docs
- HP Systems Insight Manager website: http://www.hp.com/go/hpsim
- HP Technical support for HP Integrity servers website: http://www.hp.com/support/itaniumservers/
- HP Technical Support website: http://www.hp.com/support
- Net-SNMP website: http://www.net-snmp.net

- Red Hat website: http://www.redhat.com
- SPOCK website: http://www.hp.com/storage/spock
- White papers and Analyst reports: http://www.hp.com/storage/whitepapers

Prerequisites

Prerequisites for installing or using this product include:

- Microsoft Cluster Server
- Windows NT SP1
- Third-party backup software

Typographic conventions

Table 11 Document conventions

Convention	Element
Blue text: Table 11 (page 149)	Cross-reference links and e-mail addresses
Blue, underlined text: http://www.hp.com	Website addresses
Bold text	• Keys that are pressed • Text typed into a GUI element, such as a box • GUI elements that are clicked or selected, such as menu and list items, buttons, tabs, and check boxes
Italic text	Text emphasis
`Monospace` text	• File and directory names • System output • Code • Commands, their arguments, and argument values
`Monospace, italic` text	• Code variables • Command variables
`Monospace, bold` text	Emphasized monospace text

WARNING! Indicates that failure to follow directions could result in bodily harm or death.

CAUTION: Indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT: Provides clarifying information or specific instructions.

NOTE: Provides additional information.

TIP: Provides helpful hints and shortcuts.

HP Insight Remote Support software

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service or HP contractual support agreement. HP Insight Remote Support supplements your monitoring, 24x7, to ensure maximum system availability by providing intelligent event

diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate a fast and accurate resolution, based on your product's service level. Notifications may be sent to your authorized HP Channel Partner for on-site service, if configured and available in your country. The software is available in two variants:

- HP Insight Remote Support Standard: This software supports server and storage devices and is optimized for environments with 1-50 servers. Ideal for customers who can benefit from proactive notification, but do not need proactive service delivery and integration with a management platform.
- HP Insight Remote Support Advanced: This software provides comprehensive remote monitoring and proactive service support for nearly all HP servers, storage, network, and SAN environments, plus selected non-HP servers that have a support obligation with HP. It is integrated with HP Systems Insight Manager. A dedicated server is recommended to host both HP Systems Insight Manager and HP Insight Remote Support Advanced.

Details for both versions are available at:

http://h18004.www1.hp.com/products/servers/management/insight-remote-support/overview.html

To download the software for free, go to Software Depot:

http://www.software.hp.com

Select **Insight Remote Support** from the menu on the right.

Product feedback

To make comments and suggestions about a product, please send a message to the following email addresses:

- For HP StorageWorks Command View EVA: **CVfeedback@hp.com**
- For HP StorageWorks Business Copy EVA or HP StorageWorks Continuous Access EVA: **EVAReplication@hp.com**

11 Documentation feedback

HP is committed to providing documentation that meets your needs. To help us improve the documentation, send any errors, suggestions, or comments to Documentation Feedback (**docsfeedback@hp.com**). Include the document title and part number, version number, or the URL when submitting your feedback.

A Configuring the data path through MPX200 for online data migration

This appendix provides the information you need to configure the data paths through the MPX200 for online data migration using multipathing software under the following operating systems:

- Windows 2003
- Windows 2008
- Windows 2012
- RHEL 4 and 5
- Novell SLES 10 and 11
- IBM AIX 5.3 and 6.1
- HP-UX 11.11, 11.23, and 11.31
- Solaris 10 SPARC x86
- VMware ESX 3.5, VMware ESXi 4.1, VMware ESXi 5.0, and VMWare ESXi 5.1
- Citrix XenServer 6.0

NOTE: HP provides VMWare-specific instructions in a separate application note that describes how to configure the data path through the MPX200 for online data migration in a VMWare environment.

Windows multipath configuration

Table 12 Configuring Microsoft MPIO on Windows 2008

OS	Windows 2008 and Windows 2012
Multipathing software	Microsoft MPIO
Pre-migration setup	1. Enable the MPIO feature on the host. 2. Present the LUNs to the host. 3. In the Windows Control Panel, open the **Administrative Tools**, select **MPIO**, and then add the array vendor in the list. The multipath disk appears in the Device Manager for the LUNs.
Multipath installation verification	1. In the Windows Device Manager, check the Disk drives and verify that the multipath disk is present. 2. Right-click the multipath disk and check the MPIO properties to confirm the status of the paths, failover policy, and MPIO software name.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	1. Zone out the first direct path from the FC switch. 2. Refresh the Device Manager to verify that the path has been removed from the disk list.
Adding router path for the removed controller port (for example, Port A)	Add the first router path by zoning the target map and host ports. Windows Device Manager identifies the new disk drives.
Removing second direct path from controller port (for example, Port B)	1. Zone out the second direct path from the FC switch. 2. Refresh the Device Manager to verify that the path has been removed from the disk list.
Adding router path for the removed controller port (for example, Port B)	Add the second router path by zoning the target map and host ports. Windows Device Manager identifies the new disk drives.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

OS	Windows 2008 and Windows 2003
Multipathing software	Array-specific MMC EMC PowerPath HDLM HP MPIO IBM RDAC NetApp Data Motion
Pre-migration setup	Install the DSM-MPIO (device-specific module) according to the installation steps in the DSM installation manual.
Multipath installation verification	Verify the paths and status by issuing DSM commands (refer to the DSM user manual for the multipath management commands).
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	Zone out the first direct path from the active zone set on the FC switch. The path status for the path belonging to the zoned out controller port (for example, Port A) is shown as failed in the DSM GUI on the host.
Adding router path for the removed controller port (for example, Port A)	The newly added path appears online and active on the host in the DSM GUI. Depending upon the policy settings, part of host I/O may start flowing through the path presented by the router. To verify, issue the `show perf byte` command on the router to view the traffic flowing through the router ports.
Removing second direct path from controller port (for example, Port B)	The path status for the path belonging to the zoned-out controller port (for example, Port B) is shown as failed in the DSM GUI on the host. The entire host I/O now must flow through the router. Verify that the `show perf byte` command shows the I/O flowing through the router.
Adding router path for the removed controller port (for example, Port B)	The host initiator port is seen as online and logged in on the router CLI and HP StorageWorks mpx Manager. The newly added path appears online and active on the host in the DSM GUI. Depending upon the policy settings, part of the host I/O may start flowing the new path presented by the router.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

Linux multipath configuration

Table 13 Configuring native device Mapper-Multipath on Linux

OS	Linux: RHEL 4 and 5, SLES 10 and 11
Multipathing software	Native Device Mapper-Multipath
Pre-migration setup	Enable the multipath service on the Linux host. Ensure that the `/etc/multipath.conf` entry for the array is as recommended by the vendor.
Multipath installation verification	Issue the `multipath -ll` command and verify that multiple paths exist for the multipath device mapper disk.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	The status for the path belonging to the zoned-out controller port (for example, Port A) is shown as failed or faulty in the `multipath -ll` output on the host. **NOTE:** For NetApp, use the NetApp-provided multipath.conf entry, which should be updated in `/etc/multipath.conf1`.
Adding router path for the removed controller port (for example, Port A)	The newly added path appears active or ready on the host in the multipath -ll output. Depending on the policy settings, part of the host I/O may start flowing through the path presented by the router. To verify, issue the show `perf byte` command on the router, which shows the traffic flowing through the router ports.

Table 13 Configuring native device Mapper-Multipath on Linux *(continued)*

Removing second direct path from controller port (for example, Port B)	The path status for the path belonging to the zoned-out controller port (for example, Port B) is shown as failed or faulty in the `multipath -ll` output on the host. The entire host I/O now must flow through the router. Verify that the `show perf byte` command shows the I/O flowing through the router.
Adding router path for the removed controller port (for example, Port B)	The host initiator port is seen as online and logged in on the router CLI and HP StorageWorks mpx Manager. The newly added path appears active and ready on the host in the `multipath-ll` output. Depending upon the policy settings, part of the host I/O may start flowing the new path presented by the router.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

For HP EVA devices, modify the `/etc/multipath.conf` entries as follows:

```
device {
    vendor          "HP|COMPAQ"
    product                 "HSV1[01]1 \(C\)COMPAQ|HSV[2][01]0|HSV300|HSV4[05]0"
    path_grouping_policy    group_by_prio
    getuid_callout          "/sbin/scsi_id -g -u -s /block/%n"
    path_checker            tur
    path_selector           "round-robin 0"
    prio                    alua
    rr_weight               uniform
    failback                immediate
    hardware_handler        "0"
    no_path_retry           12
    rr_min_io               100
}
```

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

Table 14 Configuring EMC PowerPath on Linux

OS	Linux: RHEL 4 and 5, SLES 10 and 11
Multipathing software	EMC PowerPath
Pre-migration setup	Install PowerPath software as recommended by the vendor.
Multipath installation verification	Issue the `powermt display dev=all` command and verify the PowerPath multipath disk and available paths.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	The `powermt display dev=all` command displays the path state as "dead." The other active and alive path continues the I/O.
Adding router path for the removed controller port (for example, Port A)	Perform a rescan on the Linux host to identify the new paths. The `Fdisk -l` command displays the LUN through the newly added path. The `powermt display dev=all` command lists the additional router path to the same LUN along with the direct path.
Removing second direct path from controller port (for example, Port B)	The `powermt display dev=all` command displays the path state as `dead`. The other active and alive router path continues the I/O.
Adding router path for the removed controller port (for example, Port B)	1. Perform a `rescan` on the Linux host to identify the new paths. 2. Issue the `Fdisk -l` command to list the LUN through the newly added path. 3. Issue the `powermt display dev=all` command to list the additional path to the same LUN along with first router path.

Table 15 Configuring Hitachi Dynamic Link Manager on Linux

OS	Linux: RHEL 4 and 5, SLES 10 and 11
Multipathing software	HDLM

Table 15 Configuring Hitachi Dynamic Link Manager on Linux *(continued)*

Pre-migration setup	Install HDLM software as recommended by the vendor.
Multipath installation verification	To check the multipath status of the disks, issue the `dlnkmgr view -path` command.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	The path status for the path belonging to the zoned-out controller port (for example, Port A) is shown as "failed" in the HDLM on the host.

Adding router path for the removed controller port (for example, Port A)	The host initiator port is seen as online and logged in on the router CLI and HP mpx Manager. The newly added path appears online and active on the host in HDLM. Depending upon the policy settings, part of the host I/O may start flowing through the path presented by the router.
	1. To verify, run the `show perf byte` command on the router to view the traffic flowing through the router ports.
	2. To rescan the new path through the router, issue the following command:
	`# echo "- - -" > /sys/class/scsi_host/host2/scan;`
	`# echo "- - -" > /sys/class/scsi_host/host2/scan;`
	3. Issue the following HDLM-related commands:
	`dlmcfgmgr -r`
	`dlmcfgmgr -v`
	`dlnkmgr view -path`

Removing second direct path from controller port (for example, Port B)	The path status for the path belonging to the zoned-out controller port (for example, Port B) is shown as online and offline in the `dlnkmgr view -path` command output on the host. The entire host I/O now must flow through the router. To verify, issue the `show perf byte` command.
Adding router path for the removed controller port (for example, Port B)	The host initiator port is seen as online and logged in on the router CLI and HP StorageWorks mpx Manager. The newly added path appears on the host in the `dlmcfgmgr -v` output. Depending on the policy settings, part of the host I/O may start flowing the new path presented by the router. To rescan the new path, issue the `dlmcfgmgr -r` command.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

IBM AIX Multipath Configuration

Table 16 Configuring EMC PowerPath on IBM AIX

OS	IBM AIX 5.3 and 6.1
Multipathing software	EMC PowerPath (only PowerPath multipath software is qualified with AIX 5.3 and 6.1 for router insertion).

Pre-migration setup	1. Verify that the LUN is not accessible to any other host except the source host: the LUN must have no zoning for new storage.
	2. Ensure that the AIX host reserve policy settings are set correctly to `no_reserve`.
	3. Disable the `reserve_lock` for AIX hosts as follows:
	a. Check the disk attribute to see if any lock is enabled. To check the lock status for a specific disk (for example, `hdiskpower10`), issue the following command:
	`# lsattr -El hdiskpower10 |grep reserve`
	`//check the reserve_lock inforeserve_lock yes`
	`Reserve device on open True`
	b. If any application (for example, Oracle database) is running on the disk or LUN, stop the application.
	c. Unmount the file system as follows:
	`# umount /u01`

Table 16 Configuring EMC PowerPath on IBM AIX *(continued)*

	d. Vary off the volume group as follows:
	`# varyoffvg vgu01`
	e. Change the `reserve_lock` setting as follows:
	`# chdev -l hdiskpower10 -a reserve_lock=no`
	`hdiskpower10 changed`
	f. Confirm that the change was made as follows:
	`# lsattr -El hdiskpower10 |grep reserve`
	`noreserve_lock  no Reserve device on open`
	`True`
	g. Vary on the volume group as follows:
	`# varyonvg vgu01`
	h. Mount the file system as follows:
	`# mount /u01`
	i. Start the Oracle database application.

Multipath installation verification	None.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	1. Issue the `powermt display dev=all` command to display the path state and physical disk associated with this PowerPath device. The removed path shows up as *dead*. The other active and alive path continues the I/O 2. Issue the `cfgmgr` command to view updated path information. PowerPath automatically updates the path status upon detecting a path failure. .
Adding router path for the removed controller port (for example, Port A)	1. Zone in the router presented target controller for Port A. 2. On the AIX host, issue the `cfgmgr` command. 3. Issue the `powermt display dev=all` command to list the additional path to the same LUN along with direct path.
Removing second direct path from controller port (for example, Port B)	Issue the `powermt display dev=all` command to display the path state and physical disk associated with this PowerPath device. The removed path shows up as *dead*. The other active and alive path continues the I/O.
Adding router path for the removed controller port (for example, Port B)	1. Zone in the router presented target controller for Port B. 2. On the AIX host, issue the `cfgmgr` command to view updated path information. 3. Issue the `powermt display dev=all` command to view the additional path to the same LUN, along with the first router path.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

HP-UX multipath configuration

NOTE: For HP-UX Boot volume migration details, see "HP-UX Boot volume migration" (page 168).

Table 17 Configuring HP PVLinks on HP-UX

OS	HP-UX 11.11 and 11.23
Multipathing software	HP PVLinks
Pre-migration setup	Ensure that the `/dev/dsk/c*t*d*` entries of the alternate paths (PVLinks) have been added to the volume group for all the LUNs forming the volume group by issuing the following command: `vgdisplay -v testvg`

Table 17 Configuring HP PVLinks on HP-UX *(continued)*

Multipath installation verification	Verify that the volume group created has multiple PVs. Each PV is a path to the same disk. The first path for each LUN is treated as the primary path, while all other paths are treated as alternate PVLinks, which are used to failover I/O in case of primary path failure.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	On the HP-UX host before zoning out the controller (for example, Port A), issue the following command: `vgreduce /dev/vg1 /dev/dsk/c1t0d1` where `/dev/vg1` is the volume group and `/dev/dsk/c1t0d1` corresponds to the PV device entry for the controller port that is removed from being directly accessed by the host.

Adding router path for the removed controller port (for example, Port A)	On the HP-UX host after zoning in the router presented target con-troller (for example, Port A), issue the following commands:
	`ioscan`
	`insf -e`
	`vgextend /dev/vg1 /dev/dsk/c3t0d1`
	where `/dev/vg1` is the volume group and `/dev/dsk/c3t0d1` corresponds to the PV device entry for the newly created PV device from the disk presented by the router.

Removing second direct path from controller port (for example, Port B)	On the HP-UX host before zoning out the controller (for example, Port B), issue the following command: `vgreduce /dev/vg1 /dev/dsk/c2t0d1` where `/dev/vg1` is the volume group and `/dev/dsk/c2t0d1` corresponds to the PV device entry for the controller port that is removed from direct access by the host.

Adding router path for the removed controller port (for example, Port B)	On the HP-UX host after zoning in the router presented target con-troller (for example, Port B), issue the following commands:
	`ioscan`
	`insf -e`
	`vgextend /dev/vg1 /dev/dsk/c4t0d1`
	where `/dev/vg1` is the volume group and `/dev/dsk/c4t0d1` corresponds to the PV device entry for the newly created PV device from the disk presented by the router. The entire host I/O must flow through the router. To verify, ensure that the `show perf byte` command shows I/O is flowing through the router.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

Table 18 Configuring EMC PowerPath on HP-UX

OS	HP-UX 11.23 and 11.31
Multipathing software	EMC PowerPath
Pre-migration setup	1. Install the PowerPath. 2. Issue the `powermt display dev=all` command and verify that it shows all of the active paths to the LUNs. 3. Create a volume group using any of the direct path disks.For example: `vgcreate vg1 /dev/dsk/c4t0d1`
Multipath installation verification	Verify that the `powermt display dev=all` command shows all the active paths to the LUNs.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	It is not necessary to perform `vgreduce` on the direct path. The `powermt display dev=all` command displays the path state as *dead*. The other active and alive path continues the I/O.

Table 18 Configuring EMC PowerPath on HP-UX *(continued)*

Adding router path for the removed controller port (for example, Port A)	On the HP-UX host after zoning in the router presented target controller (for example, Port A), issue the following commands:
	`ioscan`
	`insf -e`
	The `powermt display dev=all` command lists the additional path to the same LUN along with the direct path.

Removing second direct path from controller port (for example, Port B)	The `powermt display dev=all` command displays the path state as *dead*. The other active and alive router path continues the I/O.

Adding router path for the removed controller port (for example, Port B)	On the HP-UX host after zoning in the router presented target controller (for example, Port B), issue the following commands:
	`ioscan`
	`insf -e`
	The `powermt display dev=all` command lists the additional path to the same LUN along with the first router path.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

Table 19 Configuring native multipathing on HP-UX

OS	HP-UX 11.31
Multipathing software	Native Multipathing
Pre-migration setup	1. To verify that multiple paths exist, issue the `scsimgr LUN_map` command. The *Last open or closed State* of the path is either active or standby, based on the LUN ownership and array type. 2. Use the multipath disk to create a volume group, for example: `vgcreate vg1 /dev/rdisk/disk79`
Multipath installation verification	Verify that more than one path exists by issuing the `scsimgr lun_map` command. The *Last open or closed State* of the path shows as either active or standby, based the LUN ownership and array type.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	Zone out the first direct path from the active zone set on the FC switch. The *Last open or closed State* of the path changes to FAILED and the I/O will failover to the redundant active path.
Adding router path for the removed controller port (for example, Port A)	1. On the HP-UX host after zoning in the router presented target controller (for example, Port A), issue the `ioscan` command. 2. Issue the `scsimgr lun_map` command and verify that the newly added path is shown as either active or standby.
Removing second direct path from controller port (for example, Port B)	Zone out the second direct path from the active zone set on the FC switch. The *Last open or closed State* of the path changes to FAILED and the I/O will failover to the other active paths. Because there are no direct paths, I/O will failover to the router pre-sented path.
Adding router path for the removed controller port (for example, Port B)	1. On the HP-UX host after zoning in the second router presented target controller (for example, Port B), issue the `ioscan` command. 2. Issue the `scsimgr lun_map` command and verify that the newly added path is shown as either active or standby.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

Solaris multipath configuration

Table 20 Configuring native multipathing on Solaris SPARC

OS	Solaris 10 SPARC x86
Multipathing software	Native Multipathing

Pre-migration setup	1. To enable multipath on a Solaris host, refer to the following Solaris documentation.
	2. To verify the multipaths for the LUN, issue the `mpathadm list lu` command.
	3. To check the multipath device, issue the `luxadm probe` command.
	4. To check the path status, issue one of the following commands:
	`Luxadm -v display <multipath device>`
	`mpathadm show lu <device path>`

Multipath installation verification	1. To verify the multipaths for the LUN, issue the `mpathadm list lun` command.
	2. To check the multipath device, issue the `luxadm probe` command.
	3. To check the path status, issue one of the following commands:
	`Luxadm -v display <multipath device>`
	`mpathadm show lu <device path>`

Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	1. Zone out the first direct path from the FC switch. 2. To rescan the paths, issue the `devfsadm` command and verify that the disabled path is no longer available. 3. To check the number of paths now available, issue the `mpathadm list lu` command 4. To check the state of the OFFLINE path, issue the `Luxadm -v display <multipath device>` command.
Adding router path for the removed controller port (for example, Port A)	1. Add the first router path by zoning the target map and host ports. 2. To perform a rescan, run the `devfsadm` command. 3. To check if the new path is configured, issue the `cfgadm -al` command. 4. To rescan the paths, issue the `devfsadm` command and verify that the newly added path is now available. 5. To check the number of paths now available, issue the `mpathadm list lu` command. 6. To check the state of the new path, issue the `Luxadm -v display <multipath device>` command and ensure that the path is in an online state.
Removing second direct path from controller port (for example, Port B)	1. Zone out the second direct path from the FC switch. 2. To rescan the paths, issue the `devfsadm` command and verify that the disabled path is no longer available. 3. To check the number of paths now available, issue the `mpathadm list lu` command. 4. To check the state of the path, issue the `Luxadm -v display <multipath device>` command and ensure that the path is in an online state.
Adding router path for the removed controller port (for example, Port B)	1. Add the second router path by zoning the target map and host ports. 2. To perform a rescan, run the `devfsadm` command. 3. To check if the new path is configured, issue the `cfgadm -al` command. 4. To rescan the paths, issue the `devfsadm` command and verify that the newly added path is now available. 5. To check the number of paths now available, issue the `mpathadm list lu` command. 6. To check the state of the new path, issue the `Luxadm -v display <multipath device>` command and ensure that the path is in an online state.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

VMware multipath configuration

Table 21 Configuring native multipathing on VMware ESX/ESXi

OS	VMware ESX 3.5, ESXi 4.1, ESXi 5.0, and and ESXi 5.1
Multipathing software	Native Multipathing
Pre-migration setup	None
Multipath installation verification	1. In the vSphere Client GUI, select the **Configuration** tab. 2. Click the **Storage** menu item in the left pane, and then select the **Devices** tab. 3. In the **View** menu in the right pane, select the device and click the **Manage Paths** link to verify the available paths and their status for each device.
Validations during router insertion process	
Removing first direct path from controller port (for example, Port A)	1. Zone out the first direct path from the FC switch. 2. Rescan the storage adapters to verify that the path has been removed from the disk list.
Adding router path for the removed controller port (for example, Port A)	Add the first router path by zoning the presented target and host ports. Rescan the storage adapters to identify the new disk drives.
Removing second direct path from controller port (for example, Port B)	1. Zone out the second direct path from the FC switch. 2. Rescan the storage adapters to verify that the path has been removed from the disk list.
Adding router path for the removed controller port (for example, Port B)	Add the second router path by zoning the presented target and host ports. Rescan the storage adapters to identify the new disk drives.

These validations use the method described in "Zoning in presented targets: Method 1". Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

Citrix XenServer multipath configuration

Table 22 Configuring multipathing on Citrix XenServer

OS	Citrix XenServer 6.0
Multipathing software	Native multipathing
Pre-migration setup	None
Multipath installation verification	1. Start Citrix XenCenter, and in the left pane click **Hardware HBA virtual disk storage** (the SAN storage added to Citrix). 2. In the right pane, select the **General** tab. 3. On the **General** page, check the multipathing section for current active paths to the disk.
Validations During Router Insertion Process[1]	
Removing first direct path from controller port (for example, Port A)	1. From the FC switch, zone out the first direct path. 2. In the left pane, click **Hardware HBA virtual disk storage**. 3. In the right pane, select the **Storage** tab. 4. On the **Storage** page, select the LUN, and then click **Rescan**. 5. Select the **General** tab, and then on the **General** page, check the LUN paths in the multipathing details.
Adding router path for the removed controller port (for example, Port A)	1. Add the first router path by zoning the presented target and host ports. 2. To check the newly added path, rescan the LUN as in 4.

Table 22 Configuring multipathing on Citrix XenServer *(continued)*

Removing second direct path from controller port (for example, Port B)	1. From the FC switch, zone out the second direct path. 2. In the left pane, click **Hardware HBA virtual disk storage**. 3. In the right pane, select the **Storage** tab. 4. On the Storage page, select the LUN, and then click **Rescan**. 5. Select the **General** tab, and then on the **General** page, check the multiple paths.
Adding router path for the removed controller port (for example, Port B)	1. Add the second router path by zoning the presented target and host ports. 2. To check the newly added path, rescan the LUN as in 4.

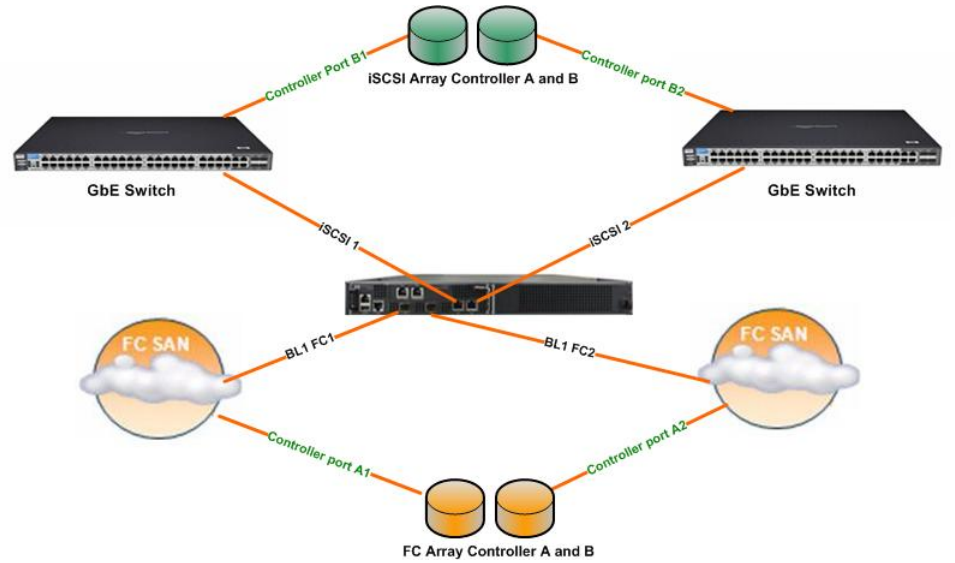
[1] These validations use the method described in "Zoning in presented targets: Method 1" on page 5-13. Alternatively, you can use the method described in "Zoning in presented targets: Method 2".

B Configuring the data path through MPX200 for iSCSI online data migration

This appendix provides information on how to configure the data path through the MPX200 for performing iSCSI to iSCSI and iSCSI to FC online data migration. It covers pre-insertion requirements, the insertion process with Microsoft MPIO and Dell EqualLogic DSM.

NOTE: MPX200 online migration with HP-UX hosts does not require you to change the initiator type. Leave the initiator set to the default, Windows.

Figure 40 iSCSI to iSCSI online data migration topology



Pre-insertion requirements

Before inserting the router into the iSCSI host data path to the iSCSI storage array, ensure that the host, MPIO, and initiator meet the following requirements:

- The iSCSI host must have one dedicated subnet for iSCSI traffic.
- The MPIO must be enabled on the iSCSI host. (On Windows 2008, MPIO is enabled by default.)
- Ensure that the Microsoft iSCSI initiator is installed on the iSCSI host. (On Windows 2008, the initiator is already installed. For other OSs, download the iSCSI initiator from the Microsoft Web site.

Insertion process with Microsoft MPIO

Follow these steps to insert the router iSCSI paths with the Microsoft MPIO:

1. Using the Microsoft iSCSI initiator on the host machine, discover one of the iSCSI ports on each of the router blades. This step creates initiator entrieson the blades. Ensure that the iSCSI hosts have a logged-out status.
2. Perform target presentation for the iSCSI target byissuing the targetmap addcommand, see “targetmap” (page 137) on the iSCSI portal. This step creates an iSCSI presented target. To present the target, specify VPGROUP1.

   The newly created iSCSI presentation has an IQN in the *formattarget_iqn.blade_serial_number.portal_index*.
3. Assign the iSCSI LUN to the iSCSI initiator by issuing the `lunmask add` command, see “lunmask” (page 90).

4. Perform discovery again from the host to one iSCSI ports on each of the router blades. Ensure that the iSCSI presented target is listed on the Target's property page of the Microsoft iSCSI initiator.
5. From Blade 1, log in or connect to the presented target.
6. Select the **Enable multi-path** option, and then verify that two paths are visible for the LUN. Because the default load balancing policy for the Microsoft iSCSI initiator is round robin, traffic is distributed between the direct path and the blade 1 path.
7. Disconnect or log out from the direct path.

   The I/Os should fail over from the direct path to the Blade1 path.
8. Using Iometer, verify that the I/Os have not stopped.
9. Issue the `show perf byte` command, see "show perf byte" (page 130) to ensure that blade1 I/Os are going through the router.
10. From Blade 2, log in or connect to the presented target. The traffic should now be evenly divided between Blade1 and Blade2.

Insertion process with Dell EqualLogic DSM

Follow these steps to insert the router iSCSI paths with the Dell EqualLogic DSM on Windows Server 2008:1.2.

1. Install the Dell EqualLogic DSM for your OS. Refer to the HIT Installation and User's Guide for instructions.
2. On the Windows Server 2008, follow these steps to perform remote setup:
   a. Start the setup for DSM.
   b. Accept the terms of the license agreement.
   c. Select the typical installation mode.
   d. Click Install to start the installation.
   e. When prompted, reboot the host. After the reboot, Remote Setup Wizard starts automatically.
   f. Select the following in the Remote Setup Wizard:
      1. Subnets included for MPIO (the subnet dedicated for iSCSI traffic).
      2. Subnets excluded from MPIO (the management subnet).
      3. Default load balancing policy (least queue depth). This policy compensates for uneven loads by distributing proportionately more IO requests to lightly loaded processing paths).
      4. Maintain default settings for the following parameters, unless you are an advanced user:
         a. Max sessions per volume slice
         b. Max sessions per entire volume
         c. Minimum adapter speed
         d. Use MPIO for snapshots
         e. Use IPv4 or IPv6.
3. Repeat the steps listed in "Insertion process with Microsoft MPIO" (page 162). However, in Step 6 you do not need to select the **Enable multi-path** option, because the Dell EqualLogic DSM is automatically chosen for MPIO.

C SNMP

SNMP provides monitoring and trap functions for managing the router through third-party applications that support SNMP. The router firmware supports SNMP versions 1 and 2 and a QLogic management information base (MIB). You may format traps using SNMP version 1 or 2.

SNMP Parameters

You can set the SNMP properties using HP mpx Manager or the CLI.

Table 23 (page 164) describes the SNMP parameters.

Table 23 SNMP parameters

Parameter	Description
`Read community`	A password that authorizes an SNMP management server to read information from the router. This is a write-only field. The value on the router and the SNMP management server must be the same. The read community password can be up to 32 characters, excluding the number sign (#), semicolon (;), and comma (,). The default password is public.
`Trap community`	A password that authorizes an SNMP management server to receive traps. This is a write-only field. The value on the router and the SNMP management server must be the same. The trap community password can be up to 32 characters, excluding the number sign (#), semicolon (;), and comma (,). The default password is private.
`System location`	Specifies the name of the router location. The name can be up to 64 characters, excluding the number sign (#), semicolon (;), and comma (,). The default is undefined.
`System contact`	Specifies the name of the person to be contacted to respond to trap events. The name can be up to 64 characters, excluding the number sign (#), semicolon (;), and comma (,). The default is undefined.
`Authentication traps`	Enables or disables the generation of traps in response to authentication failures. The default is `disabled`.

SNMP trap configuration

SNMP trap configuration lets you set up to eight trap destinations. Choose from Traps 1–Trap 8 to configure each trap. Table 24 (page 164) describes the parameters for configuring an SNMP trap.

Table 24 SNMP trap configuration parameters

Parameter	Description
`Trap n enabled`	Enables or disables trap n. If disabled, the trap is not configured.
`Trap address`[1]	Specifies the IP address to which the SNMP traps are sent. A maximum of eight trap addresses are supported. The default address for traps is `0.0.0.0`.
`Trap port`[1]	Port number on which the trap is sent. The default is `162`. If the trap destination is not enabled, this value is `0` (zero). Most SNMP managers and management software listen on this port for SNMP traps.
`Trap version`	Specifies the SNMP version (1 or 2) with which to format traps. The default is `0`, no trap version.

[1] Trap address (other than 0.0.0.0) and trap port combinations must be unique. For example, if trap 1 and trap 2 have the same address, they must have different port values. Similarly, if trap 1 and trap 2 have the same port value, they must have different addresses.

Notifications

The router provides notifications for events related to data migration jobs, including when a job is:

- Added
- Removed
- Paused
- Resumed
- Failed
- Stopped
- Restarted

qsrDMNotification object definition

The `qsrDMNotification` object is defined as follows:

```
qsrDMNotification NOTIFICATION-TYPE
 OBJECTS {
  qsrJobId,
  qsrJobOwner,
  qsrJobCreator,
  qsrJobType,
  qsrJobOpCode,
  qsrJobOperation,
  qsrJobPriority,
  qsrJobStartType,
  qsrJobErrorCode,
  qsrEventTimeStamp,
  qsrEventSeverity,
  qsrBladeSlot
 }
```

Data migration Solution notification object types

qsrJobId OBJECT-TYPE

Syntax: Integer

Status: Current

Description: ID of the data migration job for which the trap is sent out.

qsrJobOwner OBJECT-TYPE

Syntax: Integer

Status: Current

Description: Current owner of a data migration job for which a trap is sent out. The current job owner may be different from the creator.

qsrJobCreator OBJECT-TYPE

Syntax: Integer

Status: Current

Description: Creator of a data migration job for which a trap is sent out. This value remains static for all jobs.

qsrJobType OBJECT-TYPE

Syntax: Integer

Status: Current

Description: Data migration job type, either online or offline.

qsrJobOpCode OBJECT-TYPE

Syntax: Integer

Status: Current

Description: Data migration job operation type, either migration or comparison.

qsrJobOperation OBJECT-TYPE

Syntax: Integer

Status: Current

Description: Data migration job operation performed, and whether it was user-driven or automatic. Operations include `STARTING_COPY`, `STOPPED`, `REMOVED`, and `ACKNOWLEDGED`.

qsrJobPriority OBJECT-TYPE

Syntax: Integer

Status: Current

Description: Data migration job priority for a serial scheduled job. This field is valid only for serial scheduled jobs; for any other job type, the value is zero.

qsrJobStartType OBJECT-TYPE

Syntax: Integer

Status: Current

Description: Data migration job start type, either `immediate start`, `delayed scheduled`, or `serial scheduled`. To prevent the running job from losing its identity, this field becomes valid for any job that is already started, regardless of the start type.

qsrJobErrorCode OBJECT-TYPE

Syntax: Integer

Status: Current

Description: Data migration job error codes for all failed migration jobs. For all other jobs and job states, this field remains zero.

qsrEventSeverity

Syntax: Integer

Status: Accessible for notify

Description: Indicates the severity of the event. The value `clear` specifies that a condition that caused an earlier trap is no longer present.

qsrBladeSlot

Syntax: Integer

Status: Accessible for notify

Description: Indicates from which blade the trap is generated.

qsrEventTimeStamp

Syntax: Integer

Status: Accessible for notify

Description: Indicates from which blade the trap is generated.

D HP-UX Boot volume migration

Data migration

HP-UX Boot volume migration rules:

- MPX200 Data Migration supports both HP-UX11i versions 2 and 3 boot volume migration.
- Boot volume migration in an HP-UX environment is supported only with the MPX200 Data Migration OFFLINE method.
- Boot volume migration supports both stand alone systems (non vPar) and vPar configurations.

Stand alone systems (non vPar configurations)

Pre Migration

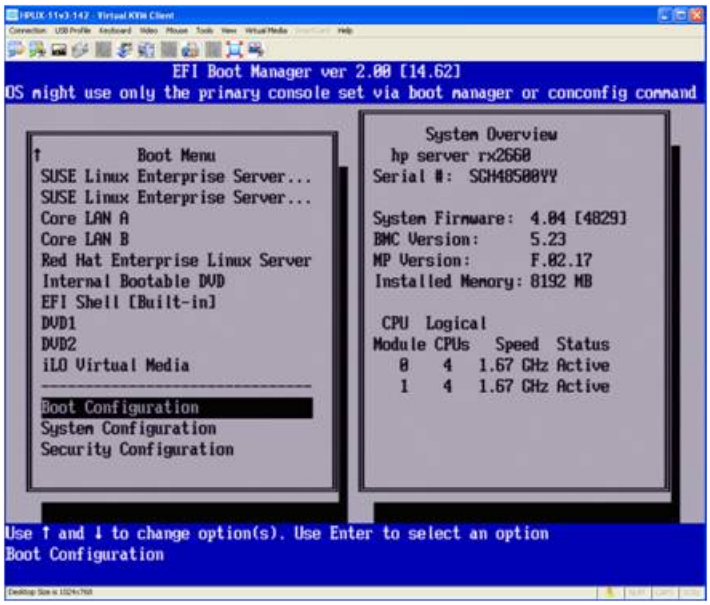
- As the data migration must be done OFFLINE, shut down the system.

Post Migration

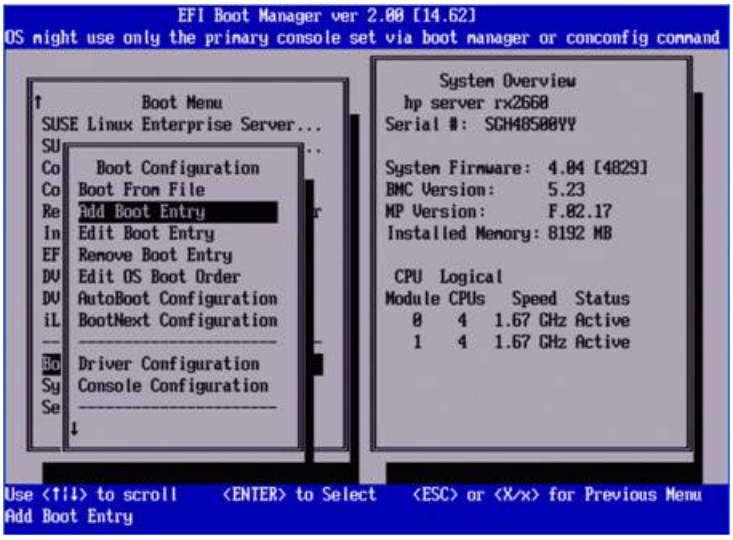
- When bringing up the host, bring the host in single path boot volume and storage only. Once the first boot is complete all remaining paths to the storage can be enabled.
- To boot from the destination SAN disk, the disk must first be discovered. Follow the recommended procedures for your system for boot LUN discovery, and select the correct LUN for booting.
- HP recommends that the boot LUN ID is presented as ID **0**. Presenting it to another ID can cause the LUN not to be detected during a device scan.

Example boot process in an Itanium server environment

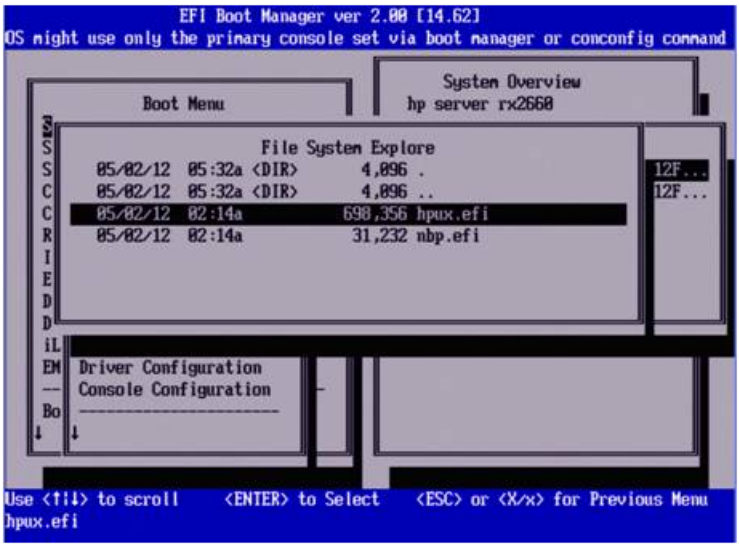
1. Go to the EFI **Boot Menu** and select **Boot Configuration**.



2. Select **Add Boot Entry**. A rescan of all the hardware is performed to detect the boot files.



3. Select the correct device, select the file `hpux.cfi` from the HPUX folder, and save it with a new name.


EFI Boot Manager ver 2.00 [14.62]
OS might use only the primary console set via boot manager or conconfig command
Boot Menu
System Overview
hp server rx2660
File System Explore
05/02/12 05:32a <DIR> 4,096 .
05/02/12 05:32a <DIR> 4,096 ..
05/02/12 02:14a 698,356 hpux.efi
05/02/12 02:14a 31,232 nbp.efi
Driver Configuration
Console Configuration
Use <↑↓> to scroll <ENTER> to Select <ESC> or <X/x> for Previous Menu
hpux.efi

4. Select the newly created boot option to boot from the new LUN.

vPar configurations

Pre Migration

- As the data migration must be done OFFLINE, shut down the system using the recommended procedures to shutdown the vPars and system.
- Itanium servers require nPar mode for complete system shutdown.

Post Migration

- When bringing up the host, bring it up as single path boot volume and storage only. Once the first boot is complete all the remaining paths to the storage can be enabled.
- To boot from the destination SAN disk, the disk must first be discovered. Follow the recommended procedures for your system for a boot LUN discovery, select the LUN for the booting, and boot the vPars.

- HP recommends that the boot LUN is presented as ID **0**. Presenting it with another ID can cause the boot LUN to not be discovered when a device scan is performed.
- Once the vPar is booted, check all the boot paths and the boot options in the vPar data base, and modify them to reflect the new boot paths.

Example boot processes in vPar environments

PA-RISC systems

Once the boot disk is found by the recommended search procedure for PA-RISC systems, the vPar needs to be booting with `–o “”` to ensure the first vPar boots with no options.

Example of winona1 vpar boot

```
BCH> bo <boot disk>
interact with IPL? y
.
ISL> hpux /stand/vpmon vparload winona1 –o “”
```

Itanium Systems

Once the boot disk is found by the recommended search procedure for Itanium systems, the vPar needs to be booting with `–o “”` to ensure the first vPar boots with no options. Itanium systems require vPar mode for booting vPar. Follow the recommended procedure for setting vPar mode.

Example of winona1 vpar boot

```
EFI_Shell> fs0:
Fs0:\> vparconfig reboot vPars
```

System reboots and needs to go to EFI again, interrupt this manually:

```
Fs0:\> hpux boot vpmon
```

Once in the monitor:

```
MON> vparload –p winona1 -o “”
```

E Troubleshooting

Table 25 (page 171) lists some problems that may occur with the data migration service and provides a possible reason or solution for each.

Table 25 Troubleshooting

Problem	Reason and Solution
The `show array` command either: • Does not show any array entities. • Does not show all the controller ports zoned in with the MPX200.	Ensure that the zoning is correctly set up on the switches. Ensure that the `show targets` command is not showing any entry for the array. If `show targets` is showing an entry for the target array, it means that the MPX200 is zoned correctly, but no data LUNs are mapped to the MPX200 ports. Add masking for the required data LUNs so that they are seen by the MPX200. For more information, see "show targets" (page 134).
The `migration add` command does not show any source or destination array.	By default, the target type attribute for an array is *Unknown*. Use the `set array` command to set it appropriately.
The `migration add` command fails to start a job.	Verify that the arrays are still visible and online.
Setting the array bandwidth does not cause any change in the data transfer rate in `show perf` output.	Array bandwidth is a *source-only* feature. Make sure that the bandwidth setting has been configured on the array that contains the source LUN. If the setting is configured on the array holding the destination LUN, no effect is seen.
Migration failover to active path does not occur.	Ensure that both the MPX200 ports are correctly masked for the LUN under consideration, and that both controllers are correctly zoned with both the MPX200 FC ports.
Resetting the local MPX200 router (by issuing the `reset factory` and `reboot` commands) deletes its own database, but does not delete user-configured data on the remote router. Because the presentations are still active on the remote MPX200, resetting prevents remote peer removal until you delete presentations from both the local and remote MPX200.	To remove a remote peer, first remove the remote presentations and the remote peer entry from both the local and remote MPX200 routers, and then reset the MPX200s as follows: 1. On both MPX200 routers, remove presentations by issuing the `targetmap rm` command. 2. On both MPX200 routers, remove the remote peer by issuing the `remotepeer rm` command. 3. On both MPX200 routers, reset the MPX200 by issuing either the `reset mappings` or the `reset factory` command. 4. On both MPX200 routers, restart the blade firmware by issuing the `reboot` command. If you cannot remove presentations and remote peers, issue the `reset mappings` command to remove user-configurable settings on the router.
A migration job goes into running state, halts at the *Running (0% complete)* state for a while, and then fails.	Make sure that the controller ports zoned for the accessing source and destination array LUNs also own the respective LUNs. In other words, if the source LUN is being accessed by the MPX200 through a controller port belonging to Controller A while the LUN is actually owned by Controller B, the MPX200 will allow you to configure a migration job but will not be able to do any data access operations for that LUN.

The MPX200 displays the following messages, for example (your WWULN and LUN ID will be different):
`Array reconfiguration detected. Refer to user manual for trouble shooting.`
`WWULN:`
	The MPX200 sees the same LUN ID being presented for two different LUNs. This situation can occur if you try to change the set of LUNs exposed to the MPX200 without removing associated migration jobs and zoning out the original set of LUNs. To keep the LUN object database maintained by the MPX200 in a sane state, ensure that

Table 25 Troubleshooting *(continued)*

Problem	Reason and Solution
`60:05:08:b4:00:05:4d:94:00:00:c0:0 0:00:2c:00:00 and WWULN: 60:05:08:b4:00:05:4d:94:00:00:c0:0 0:00:2d:00:00 mapped on same LUN ID: 8. Marking LUN offline: LUN ID: 8 WWULN: 60:05:08:b4:00:05:4d:94:00:00:c0:0 0:00:2d:00:00`	you explicitly acknowledge or remove all migration jobs associated with a set of LUNs that need to be removed. Only after that should you assign the new set of LUNs to the MPX200 host group. You must refresh the GUI three times to rediscover the new set of LUNs. For more information, see "General precautions" (page 142).
The MPX200 displays the following messages, for example (your WWULN and LUN ID will be different): `Array reconfiguration detected. Refer to user manual for trouble shooting. WWULN: 60:05:08:b4:00:05:4d:94:00:00:c0:0 0:00:2d:00:00 mapped on different LUN IDs: 8 and 9. Marking LUN offline: LUN ID: 8, WWULN: 60:05:08:b4:00:05:4d:94:00:00:c0:0 0:00:2d:00:00. LUN with ID: 8 is not presented`	The MPX200 sees the same WWULN through different LUN IDs from the same array. This can happen if the two MPX200 ports are placed in different host groups and you inadvertently assign different LUN IDs while presenting a specific LUN to the two host groups. To avoid this situation, put both MPX200 ports under the same host group. For more information, see "General precautions" (page 142).
The MPX200 does not show masked LUNs, and instead shows LUN 0 only with *offline* status for an EMC CX array.	Verify that the MPX200 port is registered with the storage system through the same storage controller port through which it is trying to access the LUNs. If the MPX200 ports are registered with SPA-0 port, and SPA-1 port is zoned with the MPX200 ports on the switch, the MPX200 will not see any of the assigned LUNs. When presenting a data LUN for the first time, the router considers it to be an array reconfiguration scenario, where the data LUN replaces the controller LUN. To see the correct LUN details, perform either of these options: • In the CLI, issue the `rescan devices` command, and then select the appropriate array. • In HP mpx Manager, right-click the appropriate array in the router tree, and then click **Rescan**.
The MPX200 tries to start a scheduled job and shows a job in Pending state instead of *Running* state.	Make sure that the LUN state is online for both the source and destination LUNs. Check if the zoning configuration is valid and that the arrays are shown in an online state. If the array state is online and the LUN state is offline, make sure that the LUN presented to the MPX200 at the time of configuring the job has not been replaced by another LUN at the time of starting the job. This is a case of reconfiguration and the associated job will have to be deleted. For more information, see "Reconfiguring LUNs on a storage array" (page 146).
While running a data migration job using a Dell EqualLogic storage array as the source, the following may take a longer time (up to one minute) to complete successfully: • Refreshing the HP mpx Manager user interface. • Executing the `show migration_luninfo` or `show luninfo` commands in the CLI.	The commands for scanning LUNs from EqualLogic may time out, causing a temporary connection loss. Wait approximately one minute for the router to reconnect and continue with the migration job.
Migration job fails on an active-passive array, even though the host I/O uses the same router path.	For older active-passive arrays, a data migration job may fail if the active path disappears from the router while host I/Os are not active. To allow the router to discover new paths, rescan the array, and then reconfigure the migration job. No migration licenses are consumed when a job fails.

Table 25 Troubleshooting *(continued)*

Problem	Reason and Solution
	(To rescan an array in HP mpx Manager, right-click the appropriate array in the router tree, and then click Rescan.)
After zoning the presented target ports with the host, LUNs are not visible through the router paths.	This problem can occur if you map LUNs for presentation and also create a global presentation for a presented target. If you map LUNs, use VPG-based target maps instead. Use global target presentation only when you remap LUNs for presentation.
The migration job shows extensive performance degradation or remains at a zero percent running state although the LUNs appear online.	This problem can be caused by faulty SFPs or cables used for the router ports. To check, view the switch logs associated with the FC port connections. For every port, compare the `Lr_in` and `Ols_out` values, as well as the `Lr_out` and `Ols_in` values. A drastic difference in these values indicates a bad SFP or bad cable connection.

Glossary

A

AMS Attachable Modular Storage

array A storage system that contains multiple disk or tape drives. A disk array, for example, is differentiated from a disk enclosure, in that the array has cache memory and advanced functionality, like RAID and virtualization. Components of a typical disk array include disk array controllers, cache memories, disk enclosures, and power supplies.

B

bandwidth A measure of the volume of data that can be transmitted at a specified transmission rate.

C

CHAP Challenge Handshake Authentication Protocol. A protocol that defines a methodology for authenticating initiators and targets.

CSV Comma-separated value. A data file used for storage of data structured in a table form.

D

data migration The process of transferring data between storage types, formats, or computer systems. Data migration is usually performed programmatically to achieve an automated migration, freeing up human resources from tedious tasks. Migration is a necessary action for retaining the integrity of the data and for allowing users to search, retrieve, and make use of data in the face of constantly changing technology.

DHCP Dynamic Host Configuration Protocol.

DML Data management LUN.

DMS Data migration service. A technology that simplifies data migration jobs with minimum downtime while providing protection against common user errors.

DRL Dirty region logs.

DSM Device-specific module

E

EUI Extended unique identifier. Part of the numbering spaces, managed by the IEEE, commonly used for formulating a MAC address.

EVA HP StorageWorks Enterprise Virtual Array

F

fabric A fabric consists of cross-connected FC devices and switches.

FC Fibre Channel. High-speed serial interface technology that supports other higher layer protocols such as SCSI and IP, and is primarily used in SANs.

FC over Ethernet See FCoE.

FCIP FC over Internet Protocol. An Internet Protocol-level storage networking technology. FCIP mechanisms enable the transmission of FC information by tunneling data between SAN facilities over IP networks. This facilitates data sharing over a geographically distributed enterprise.

FCoE FC over Ethernet. An encapsulation of FC frames over Ethernet networks. This allows FC to use 10 Gigabit Ethernet networks while preserving the FC protocol.

Fibre Channel See FC.

FRU Field replaceable unit.

H

HA High availability. A system or device that operates continuously for a long length of time.

HDLM Hitachi Dynamic Link Manager

HDS Hitachi Data Systems

HIT Host Integration Tools

I

initiator A sSystem component, such as a network interface card, that originates an I/O operation.

IQN iSCSI qualified name

iSCSI Internet small computer system interface. Transmits native SCSI over the TCP/IP stack. In a system supporting iSCSI, a user or software application issues a command to store or retrieve data on a SCSI storage device. The request is processed by the operating system and is converted to one or more SCSI commands that are then passed to software or to a card. The command and data are encapsulated by representing them as a serial string of bytes proceeded by iSCSI headers. The encapsulated data is then passed to a TCP/IP layer that breaks it into packets suitable for transfer over the network. If required, the encapsulated data can also be encrypted for transfer over an insecure network.

iSNS Internet storage name service. Used for discovery and management of IP-based SANs.

J

jumbo frames Large IP frames used in high-performance networks to increase performance over long distances. Jumbo frames are typically 9,000 bytes for GbE, but can refer to anything over the IP MTU (1,500 bytes on an Ethernet).

L

LBA Logical block address

load balancing Adjusting components to spread demands evenly across a system's physical resources to optimize performance.

LUN Logical unit number. Representation of a logical address on a peripheral device or array of devices.

M

MMC Microsoft Management Console

MPIO Multipath I/O

MSA HP StorageWorks Modular Storage Array

MTU Maximum transmission unit. The size (in bytes) of the largest packet that a specified layer of a communications protocol can transfer.

multipath routing The routing technique of leveraging multiple alternative paths through a network, which can yield a variety of benefits such as fault tolerance, increased bandwidth, or improved security.

N

NAA Name address authority.

NPIV N_Port ID virtualization

NTP Network time protocol. Used for distributing the Coordinated Universal Time by synchronizing the clocks of computer systems over data networks.

P

P2P Port to port.

path A path to a device is a combination of an adapter port instance and a target port as distinct from internal paths in the fabric network. A fabric network appears to the operating system as an opaque network between the initiator and the target.

ping A computer network administration utility used to test whether a specified host is reachable across an IP network, and to measure the round-trip time for packets sent from the local host to a destination computer.

port Access points in a device where links attach.

There are four types of ports, as follows:

- N_Port—an FC port that supports point-to-point topology.
- NL_Port—an FC port that supports loop topology.
- F_Port—a port in a fabric where an N_Port can attach.
- FL_Port—a port in a fabric where an NL_Port can attach.

port instance The number of the port in the system.

PV Physical volumes

PVLinks Physical volume links

R

RCLI Remote Command Line Interface. A utility that you can use to configure and manage the HP MPX200 Multifunction Router.

RDAC Redundant Disk Array Controller

RHEL Red Hat Enterprise Linux

router log A log that contains messages router events.

RPC Remote procedure call. A protocol used by a program to request a service from a program located in another computer in a network.

RTT Round-trip time

S

Secure Shell See SSH.

SLES SUSE Linux Enterprise Server

SNMP Simple Network Management Protocol

SPOCK Single point of connectivity knowledge

SSH Secure shell. A protocol that secures connections to the switch for the command line interface.

SVSP HP SAN Virtualization Services Platform

T

target The storage-device endpoint of a SCSI session. Initiators request data from targets (typically media devices).

TB Terabytes

Telnet Software that implements the client part of the protocol. Telnet clients are available for nearly all computer platforms. Because of security issues with Telnet, its use has declined in favor of SSH for remote access.

U

USP Universal Storage Platform

V

VLAN Virtual local area network. A group of hosts with a common set of requirements that communicate as if they were attached to the same wire, regardless of their physical location.

VP Virtual port.

VPD Vital product data

VPG Virtual port group. A RCLI software component used to create logical FC adapter initiator ports on the fabric.

VPN Virtual private network.

W

WMS Workgroup Modular Storage

WWN World wide name.

WWNN World wide node name. Unique 64-bit address assigned to a device.

WWPN World wide port name. Unique 64-bit address assigned to each port on a device. One WWNN may contain multiple WWPN addresses.

WWULN World wide unique LUN name. WWULN identifiers for SCSI devices are read from page 80 and page 83 of your SCSI block device as based on the SCSI standard.

Z

zoning Configuring a set of FC device ports to communicate across the fabric. Through switches, traffic within a zone can be physically isolated from traffic outside the zone.

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